Essays on Aid Effectiveness and Development Finance

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Analyses de l'efficacité de l'aide et du financement du développement

Essays on aid effectiveness and development finance

Thèse Nouveau Régime

Présentée et soutenue publiquement le 27 Septembre 2013

Pour l'obtention du titre de Docteur *ès* Sciences Économiques

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La faculté n'entend donner aucune approbation ou improbation aux opinions émises dans cette thèse. Ces opinions doivent être considérées comme propres à l'auteur.

A ma famille, loin d'ici et à mes proches disparus depuis mon départ…Merci pour votre soutien.

A ma femme.

Remerciements – Acknowledgements

Je tiens à exprimer ma reconnaissance à M. le Professeur Patrick Guillaumont et à la Fondation pour les Études et Recherches sur le Développement International (FERDI)pour leur soutien et les bonnes conditions de travail dont j'ai bénéficié depuis la fin de mon Master.

Je remercie particulièrement mon directeur de thèse, le Docteur Gérard Chambas, pour l'encadrement, l'attention et le soutien dont j'ai bénéficié tout au long de ces années de thèse. Ses conseils et son ouverture d'esprit ont conduit à la réalisation de cette thèse.

Je tiens également à remercier les membres du jury : les professeurs Patrick Guillaumont, Jean-Claude Berthélémy et Jean-Louis Arcand, et le Docteur Lisa Chauvet, pour avoir accepté d'évaluer ce travail.

Mes remerciements vont aussi aux nombreuses personnes qui de près ou de loin, et de diverses manières, ont permis la réalisation de cette thèse, notamment mes amis Christian Ebeke, Luc Désiré Omgba, Eric Djimeu, les membres de l'Association Camerounaise des Etudiants et Anciens Etudiants de Clermont-Ferrand (ACEAC) et mes collègues à la FERDI.

Je témoigne ma profonde gratitude à mes parents, Paul Emmanuel Bikatal et Marie-Noel Sielatchom pour leur amour et leur soutien indéfectible tout au long de ma vie. Enfin, je remercie Milca, ma merveilleuse épouse pour son soutien quotidien.

Table of Contents

General introduction

A defining feature of developing countries is their structural handicaps to growth. Households, firms and governments frequently lack the capability to enhance their welfare and escape from poverty, contribute to economic activity and pursue good policies. Given the limited ability of many of these countries to raise domestic resources through taxation, external finance is essential to support a multi-year public investment program aimed at developing public capital in infrastructure, health, and education. Some industrialized countries agreed that a massive inflow of resources from the North was needed to stimulated more rapid economic development and eradicate widespread poverty in the South. This claim for more external capital flows is based on the proposition that there is a positive relationship between the volume of capital inflows and the rate of economic growth. They argue that substantial inflow of financial resources is needed to generate sufficient savings and investment to accelerate economic growth which will ultimately free these less developed countries from poverty. Thus, in the name of development, governments, aid agencies, and citizens from industrialized countries have often transfer capital flows to those countries to help them follow a sustainable growth and finance their development. The most external financial resources for development included foreign aid, foreign direct investment (FDI) and workers' remittances.

Does aid promote economic growth? Official foreign aid is a major source of revenue for developing countries. The macroeconomic impact of foreign aid has long been a hotly contested subject. Foreign aid's impact on growth in developing countries is arguably the most contested topic and also the most important given its implications for poverty reduction. The extent to which foreign aid can be a decisive factor in the economic development of low-income countries remains controversial. Some experts charge that aid has enlarged government bureaucracies, perpetuated bad governments, enriched the elite in poor countries,

or just been wasted. Others argue that although aid has sometimes failed, it has supported poverty reduction and growth in some countries and prevented worse performance in others. In contrast to this stream, another stand of studies argues that the impact of aid is conditional. Burnside and Dollar (2000) and Collier and Dollar (2002) argue that aid effectiveness depends on sound economic policies and good institutions, while Guillaumont and Chauvet (2001) have shown that a major factor conditioning aid effectiveness in recipient countries is the economic vulnerability they face. Thus, the welfare gain from aid should be mainly related to its stabilization impact.

Hope and frustration which surround foreign aid generate an important literature. Some see it as essentially damaging, others see aid as a crucial means to realize development outcomes and support sustained growth in the poorest countries, while others argue for a total reform of the aid system due its historical under-performance. Infusions of aid to developing countries have been recommended as a means of escaping the poverty trap, and promoting development (Sachs et al., 2004; Sachs 2005a, 2005b). However, doubts about aid effectiveness are sustained by the weak performance of recipient countries (Easterly, 2007a, 2007b; Rajan and Subramanian, 2008).

Today, foreign aid is under additional pressure as many developed countries' governments implement stringent austerity programmes in the aftermath of the global financial crisis of 2008/09. Nevertheless, new initiatives have been developed by emerging donors and private philanthropists, and emphasize the contribution of private flows like FDI or remittances.

These flows follow different patterns; foreign aid which have been the major external flows for some developing countries, is under severe pressure as donors seek to cut budgets and change the focus of aid debate towards stimulating the private sector (Nelson, 2009). At the same time workers' remittances have tremendously increased since two decades; recorded remittances in 2012 were nearly as large as foreign direct investment.

Figure 1 shows that while ODA stagnated in recent years with aid resources durably lower than international commitments, FDI and remittances have exploded since the late 1990s.

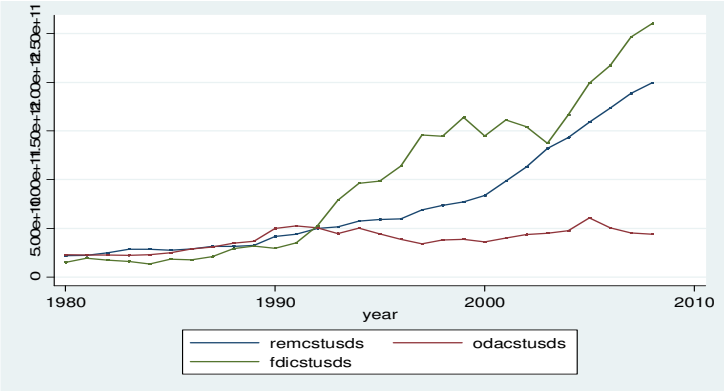

Fig1. Evolution of net ODA (red), Remittances (blue) and FDI (green) 1980 - 2008, USD constants

Determinants of Foreign direct investment

An investment is classified as FDI when the investor acquires a lasting management interest in the company invested in, normally defined as "10 percent or more of voting stock."

In 2011 there was a net inflow of FDI to developing countries of $300 billion – equivalent to 1.3% of their GDP. According to UNCTAD, net FDI inflows were equivalent to 1.6% of low-income country GDP in 2011. However, a significant proportion of these flows represent reinvested earnings from existing investments. According to UNCTAD, this was over $200 billion of the inflows total in 2011.

FDI can be seen as the response to a need of internalization of transaction costs in order to improve profitability (Banga, 2003). Brewer (1991), Kim & Park (2013) and Subbarao (2008) emphasize that the level of human capital in the host country is among other a strong determinant of FDI inflow. Indeed the high level of human capital makes easy the development of existing technologies and the increase of capital productivity. As stated by De Mooij, Ruud & Ederven (2003), fiscal policy is also relevant while one want to attract FDI. Aware that higher taxes discourage FDI, governments have tried, with varying degrees of success to direct or incentivize FDI to different areas. The issue of taxes directly leads to the

concern of institutions. Several empirical studies reveal the importance of institutions through FDI behavior models (Asiedu, 2006; Banga, 2003; Busse, 2003; Glaeser et al., 2004). More recently Caetano & Galego (2009) and Ramirez (2010) emphasize that better institutions (political stability, low level of corruption, less bureaucracy) attract more FDI.

According to Nunnenkamp (2002), globalization has changed the rules of the game. In fact, while traditional market-related determinants are still dominants factors, some new evidences emerge. Thus, natural resources endowment, human capital, fiscal policy, and institutions have gained importance. In this vein, the literature related to FDI hold that FDI inflow depend of a lot of factors among which one can quote the rate of return, internalization of cost, human capital, taxes, the availability of natural resources and institutions. Furthermore, in some countries a significant share of FDI is linked to foreign aid. For example, 64 percent of South Korea's aid is tied, 45 percent of Greece's aid, and 23 percent of the United States' aid is tied. Majority of aid from emerging countries, especially China, India, and Venezuela, is combined with special trade arrangements and commercial investments (Walz and Ramachandran, 2011).

The macroeconomic determinants of remittances

International remittances defined as the money sent back by migrant workers living abroad constitute one of the most important aspects of the current economic globalization. These flows result from the fact that more than 215 million people or 3 percent of the world population, live outside their countries of birth (United Nations Statistics Division). Remittance inflows to developing countries have tremendously increased since two decades.

According to the World Bank (2011), in 2010, worldwide remittance flows are estimated to have exceeded $440 billion. From that amount, developing countries received $325 billion

(7% of this amount is received by the low-income countries and 93% by the middle income group), which represents an increase of 6 percent from the 2009 level. The true size, including unrecorded flows through formal and informal channels, is believed to be significantly larger. Recorded remittances in 2009 were nearly three times the amount of official aid and almost as large as foreign direct investment (FDI) flows to developing countries.

The empirical literature on the macroeconomic determinants of remittance inflows has provided clear results on specific factors explaining remittance inflows. The first variable that is recognized to explain significantly the level of remittances that a country receives is the level and the composition of the stock of migrants. Countries that export a large number of emigrants receive on average more remittances than the others (Freund and Spatafora, 2008; Lueth and Ruiz-Arranz, 2008; Frankel, 2011). The composition of the migrant stock also matters. Indeed, two recent papers have confirmed the result that low skilled migrants remit more than the others (Faini, 2007; Adams, 2009). The second significant determinant of remittance inflows is the financial costs associated with remitting money. Freund and Spatafora (2008) showed that high transaction costs charged by Money Transfer Agencies (MTA) significantly reduce the amount of remittances received.

The third determinant of remittances recognized in the recent macroeconomic empirical literature is the occurrence of natural disasters. The existing cross country studies showed that remittances increase significantly in the aftermath of natural disasters (Yang, 2008; Mohapatra et al., 2009; David, 2010).

Taking an optimistic view, remittances contribute to the development of recipient countries by relieving households' financial constraints through their positive effect on financial development (Gupta et al., 2009; Aggarwal et al., 2011), by protecting them against natural disaster shocks (Yang, 2008; Mohapatra et al., 2009; David, 2010), and by reducing macroeconomic volatility (IMF, 2005; Bugamelli and Paternò, 2011; Chami, Hakura and

Montiel, 2009; Craigwell et al., 2010). It has also been shown that remittances have a positive effect on country sovereign ratings (Avendano et al., 2011) and reduce the probability of current account reversals (Bugamelli and Paternò, 2009) what contributes to build and reinforce the credibility and the attractiveness of the receiving countries in the views of the international investors.

The existing macroeconomic literature on the consequences of remittances is a mix of good news (remittances increase household welfare) and beware news (the effects beyond the households are sometimes frightening). Indeed, evidences show that remittances can contribute to increase the level of real effective exchange rate and hence, deteriorate the external competitiveness of the receiving economies. Several papers using a cross country approach with panel data have shown that remittance inflows lead to exchange rate appreciations (Amuedo-Dorantes and Pozo, 2004; Acosta, Baerg and Mandelman, 2009; Acosta, Lartey and Mandelman, 2009; Barajas et al., 2009). Chami et al. (2003) and Chami et al. (2005) emphasized that remittances could lead to a moral hazard problem on the receiving household side by reducing the labor supply and increasing leisure. This implies that remittances do not always have positive effects on economic growth.

Complementarity and substitutability between foreign aid, FDI and remittances

To summarize, foreign aid is mainly oriented to support the government budget and finance investments in human capital (Kosack and Tobin, 2006), Remittances are sending directly to households, while FDI is a private sector decision and relatively more connected to physical capital. Therefore, they enter our picture in ways quite different. Primarily, FDI is simply capital. FDI may increase growth indirectly, through creation of new fixed capital and positive externalities (Kosack and Tobin, 2006). Contrary to FDI, Aid and remittances share more common determinant factors such as income per capita in receiving countries, and are

geared to some extent toward similar development goals, for instance improving well-being in recipient countries (LeGoff and Kpodar, 2011).

If Foreign Aid, FDI and Remittances are the main external sources of development finance, the policy coherence between these flows in promoting growth and contribution to the development process has very recently been addressed in empirical work. This question usually refers to the complementarity or substitution between these capital flows, purposely in this important period in which the developed economies are facing a public finance crisis. Indeed, a decline in aid over the next five years should be considered and undermines the strategy of scaling up Aid for achieving the MDGs. The natural inclination then, is to search for how more can be obtained from the limited amount available. The research will therefore consider a dynamic in which analyze the complementarity or substitutability between aid and the other two external sources of financing for development.

The empirical studies interested by the complementarity and the substitutability between different sources of external capital flows (Aid, FDI, Remittances) only focused on two of them each time: Aid and FDI or Aid and Remittances.

The first studies on FDI and Aid saw aid as a contribution to investments that will enable the economic takeoff of the countries concerned (Thorbecke, 2000; Kanbur, 2003). Nevertheless, recent developments opposed the two flows and gradually weakened this theory, even if, there seems to be a consensus on a positive effect of aid on FDI channelled into financing infrastructure. However, this effect is conditional to the policy environment (Karakaplan et al., 2005) and it is sometimes limited to a relationship between ODA and FDI from the same partner (Kimura and Todo, 2010).

Some studies about remittances have the common belief that remittances would complement aid in fostering growth and reducing poverty. Nevertheless, there are good reasons to believe

remittances could actually lead to lower aid flows, as a country becomes less dependent on external assistance (LeGoff and Kpodar, 2011). With fiscal challenges faced by donors' countries, many of them are unable to meet aid commitments and may be tempted to reduce aid to high-remittance recipient countries and use the savings to increase aid to low-remittance recipient countries. Remittances could also be positively associated with aid because by enhancing the home country's absorption capacity—the lack of which has been often pointed out as a bottleneck to aid scaling up—remittances can in fact lead to an increase in aid.

Uncertainty in government revenues and income distribution

Bulır̆ and Hamann (2003) show that aid flows are highly volatile; their volatility is even higher than the government's domestic budget revenues. Moreover, they show that the volatility of aid flows is higher the more aid-dependent countries are. Next, they find that aid falls during periods in which domestic revenues of governments also fall and that the volatility of domestic revenues coincides with the volatility of aid flows. Lensink and Morrissey (2000) find that uncertainty in aid receipts may affect fiscal behavior that in turn may influence growth. The reasons for aid flows being uncertain may be either explicit donor country policies or actions, or external shocks. In either case, aid uncertainty may have an adverse impact on government expenditures, and in particular on public investment. A reduction of public investment may in turn lead to lower private investment, and ultimately also to lower economic growth.

The distribution of income between countries will therefore also lead to stabilize incomes for the different actors of economic activity: Government (foreign aid), private sector (FDI) and households (remittances). This will likely improve their contributions to growth. Complementarity between the external capital flows will therefore be illustrated by the stability of income distribution in economic activity and thus have a direct impact on

economic growth. In addition, it will also affect the impact of these flows on economic conditions of countries and therefore the effectiveness of these flows to promote growth.

Absorption capacity and leverage effects

Leverage effect is an important issue in empirical studies. If the leverage effect of aid on remittances is a priori unlikely (Guillaumont, 2011), the relationship between aid and foreign direct investment (FDI) has been more extensively studied in the literature and suggests several possibilities of leverage. The idea is that sector aid should finance large infrastructures that cannot be finance by the private sector alone.

Selaya and Sunesen (2012) suggested that aid may raise the marginal productivity of capital by financing complementary inputs, such as public infrastructure projects and human capital investment, but on the other hand should crowd out productive investment. The expected positive leverage effect through infrastructure only happens in case of good governance and financial market development (Karakaplan, 2005). Foreign aid also mitigates risk faced by FDI in the receiving countries, which includes the violation on contractual agreements, changes in laws and regulations (Asiedu et al., 2009).

The relationship between aid and remittances received less empirical evidence. LeGoff and Kpodar (2011) explained that when remittances are mostly invested in human and physical capital rather than consumed, they are likely to improve macroeconomic performance and access to health and education. Then remittances improve absorption capacity through human capital accumulation, which would reduce barriers to aid effectiveness.

The broad subject of this thesis is whether foreign aid and the other ECF are effective in promoting development. Despite the voluminous literature on the relationship between DF

flows and growth in recipients' economies, many points not studied or newly explored by the existing literature have constituted the starting points of the essays provided in this thesis.

1. The debate over the effectiveness of ECF has given rise to an important literature. Turning to the empirical evidence on aid effectiveness, detailed literature reviews are readily available (Hansen and Tarp, 2000; Riddell, 2007; Temple, 2010; Arndt et al. 2010). However, even for the studies on FDI and the more recent literature on remittances, empirical analyses reach to heterogeneous findings about their macroeconomic effects. Little is said about the causes of these misunderstandings even today with a better data availability and development of advanced econometrics tools. A systematic review of the research process in each of these fields is necessary.

2. The emergence of alternative sources of financing and policy models has intensified researchers and practitioners' attention on this evolution in development cooperation. Indeed, with the emergence of new economic powers there are more donor countries operating outside the Development Assistance Committee (DAC). Despite the number of papers focusing on the ongoing revolution in development assistance (Woods, 2008; Paulo and Reisen, 2010; Zimmermann and Smith, 2011; Walz and Ramachandran, 2011), nothing is said about the effect of the increasing influence of emerging donors on the aid allocation of traditional donors. If we are aware of the importance of political and strategic interests related to aid allocation, thus the question of the reaction of traditional providers of aid is central.

3. Moreover, there are no empirics about the fiscal implications of emerging donors aid allocation for recipients' governments. What we know is that some authors claimed without evidence that the success of emerging donors would lead to a macroeconomic disaster in countries welcoming their aid because they do not follow DAC's recommendations on

development assistance (Manning, 2006; Naim, 2007). Thus, the question of whether emerging donors could play a role in the development process of low-income countries or represent a treat for governance standards and public management systems in low-income countries (LICs), is particularly relevant given the increasing share of non-DAC aid in total ODA inflows in some countries.

4. Recent IMF Working papers show that shocks in foreign aid and FDI are more frequent than shocks in terms of trade and external demand in the last decades (Crispolti and Tsibouris, 2012) and also that countries dependent to remittances appear more vulnerable to risks stemming from shocks to the global economy because remittance flows significantly increase business cycle synchronization with the rest of the world (Barajas et al., 2012). These recent empirical evidences suggest that the presence of development finance flows offers both opportunities and challenges to recipient countries. Indeed, previous studies suggested that external shocks explain a smaller fraction of output volatility (Raddatz, 2007), but recognizing these facts could revived the debate about the preeminence of domestic shocks over external shocks. Although the importance of this issue in explaining the business cycle of DCs, we still lack of valid model and analytical framework that could capture the macroeconomic challenges generated by development finance flows and quantify their contribution on recipients' business cycle fluctuations.

5. Companion to external finance flows like foreign aid, Remittances and FDI, they are various international measures for development that represent a supply of possible benefits for developing countries (on agriculture, trade, health…), but do they finally enhance the welfare of recipients and contribute to their development? Surprisingly, we do not have valuable impact analyses of the major programmes designed for developing countries but we certainly

lack of methodology and empirical strategies to overcome the difficulties faced by such analyses.

Remainder of the thesis

The thesis is divided into three broad parts. Each part consists of two chapters. Our dissertation is developed around the three groups concerned by this debate of aid and development finance effectiveness: the recipients, aid architecture and the actors of development, and the researchers.

The first part uses meta-analysis methodology to draw a literature review on external development finance flows with a particular interest on the research processes follow by the empirical studies. The underlying idea of meta-analysis is to subtract the empirical evidences from authors' characteristics, econometric or methodological choices, to sum up the effective knowledge from existing works. This first part is constituted of an introduction to the meta-analysis and two chapters highlighting different areas and opportunities that such analyzes bring for the development of research.

Chapter 1 analyzes the literature on conditional aid effectiveness and the heterogeneity of studies' findings. Examining the reported estimates of aid impact in "Good Policies" and "Medicine" models, where aid effectiveness depends upon a conditional variable, this chapter seeks to determine through meta-analysis tools, if the reported estimates of conditional aid effectiveness are genuine or are supported by a publication bias. Indeed, given the political and economic stakes behind the question of foreign aid, researchers and editors are suspected to favor studies with positive results. Moreover, this chapter investigates methodological choices madeby the authorsoften without theoretical justification, which cause huge discrepancies in the findings about the effectiveness of aid.

Many development economists believe that remittances inflows are an important source of funding for long run growth. Therefore, recent studies have investigated the growth enhancing effects of remittances in the recipient countries but reached different conclusions. The Chapter 2 uses meta-analysis to combine, explain, and to summarise these disparate estimates of remittances effects. The hypothesis that there is a direct effect of remittances on growth is rejected but we find robust evidence that remittances have positive indirect effects on growth. Although there is evidence of publication selection, there is also evidence of a genuine estimate effect beyond publication bias. We also established some methodological rules for future studies on this issue.

The second part focuses on recent evolutions in aid architecture with the increasing influence of emerging donors. This part of the thesis analyzes the consequences of non-DAC donors aid allocation on government fiscal choices in recipients countries and on traditional donors' aid allocation.

Starting with fear and critics expressed towards emerging donors aid allocation, we analyze in chapter 3 if the increasing influence of emerging donors in official development assistance has led to the macroeconomic disaster in recipient economies. Indeed given that emerging donors do not follow DAC recommendations in their aid allocation, the presence of emerging donors in the aid market could increase the transaction costs in the aid allocation process and bring additional fiscal management challenges for governments. The chapter 3 investigates how emerging donors' aid allocation influences the fiscal behavior of recipients. This analysis is conducted on a panel dataset of 82 developing countries over the period 1980-2010. Our findings suggest that fear expressed by DAC donors is not justified and moreover welcoming emerging donors could help low-income countries to enhance their fiscal response to aid, in particular through an increase in their aid absorption rate.

Then chapter 4 moves to analyzing the impact of emerging donors on the allocation of traditional donors. This chapter describes the behavior of DAC donors in dealing with the increasing influence of these new leaders in development cooperation. Choosing to analyze the emergence of new donors from the DAC donors' perspective, this chapter contributes to the literature on the determinants of aid allocation, and explicitly assesses the importance of political and strategic interests in development cooperation. By confronting allocation choices at the multilateral level to the heterogeneous strategic reactions of DAC members in their bilateral aid process, this chapter highlights the importance of political and strategic interests in aid allocation. We show how traditional donors seek to keep their interests from non-DAC donors given that they also give aid to increase their commercial interests and political influence. This chapter ends by examining the impact of this competition among donors on the quality of aid provided.

The third part of the thesis proposes new evidences of the impact of external capital flows for development finance and international measures for development. Chapter 5 proposes to analyze the link between development finance and business cycles fluctuations in developing countries. The chapter revisits the Raddatz (2007)' result that external shocks can only explain a small fraction of the output volatility in low-income countries. Starting with a RBC model, the chapter shows that, when foreign aid, FDI and remittances inflows are accounted for, external shocks drive a significant share of output fluctuations in low-income countries. The findings of the theoretical simulation are supported by our panel data analysis which reported that development finance flows can account for more than twenty-five percent of economic fluctuations in aggregate output in some developing countries. The chapter 5 ends by describing the stabilizing or destabilizing property of each of these flows and the associated transmission channels, on business cycles. The findings of this chapter impose to rethink our knowledge about the openness and economic integration of developing countries, because

even for LICs characterized by their underdeveloped financial sector, with development finance flows, they appear more expose to external shocks than expected.

This thesis concludes by addressing one of the major difficulties in the development of action, assessing the impact of different policies and programs designed to support the less developed countries. One of the most important initiatives was the least developed countries (LDCs) category. The UN recognized in 1971 that some developing countries have particular structural characteristics which dampen their economic development and make them more likely to remain caught in the poverty trap. The LDCs are defined as being among the poorest countries in the world; they have low level of human capital and are highly vulnerable to natural and external shocks. The Chapter 6 evaluates the contribution of the measures designed to support LDCs and analyses the impact of being categorised as a Least Developed Country (LDC) on economic growth and the vulnerability to economic shocks. Moreover, this chapter proposes an empirical methodology that could help to perform macroeconononomic impact evaluation.

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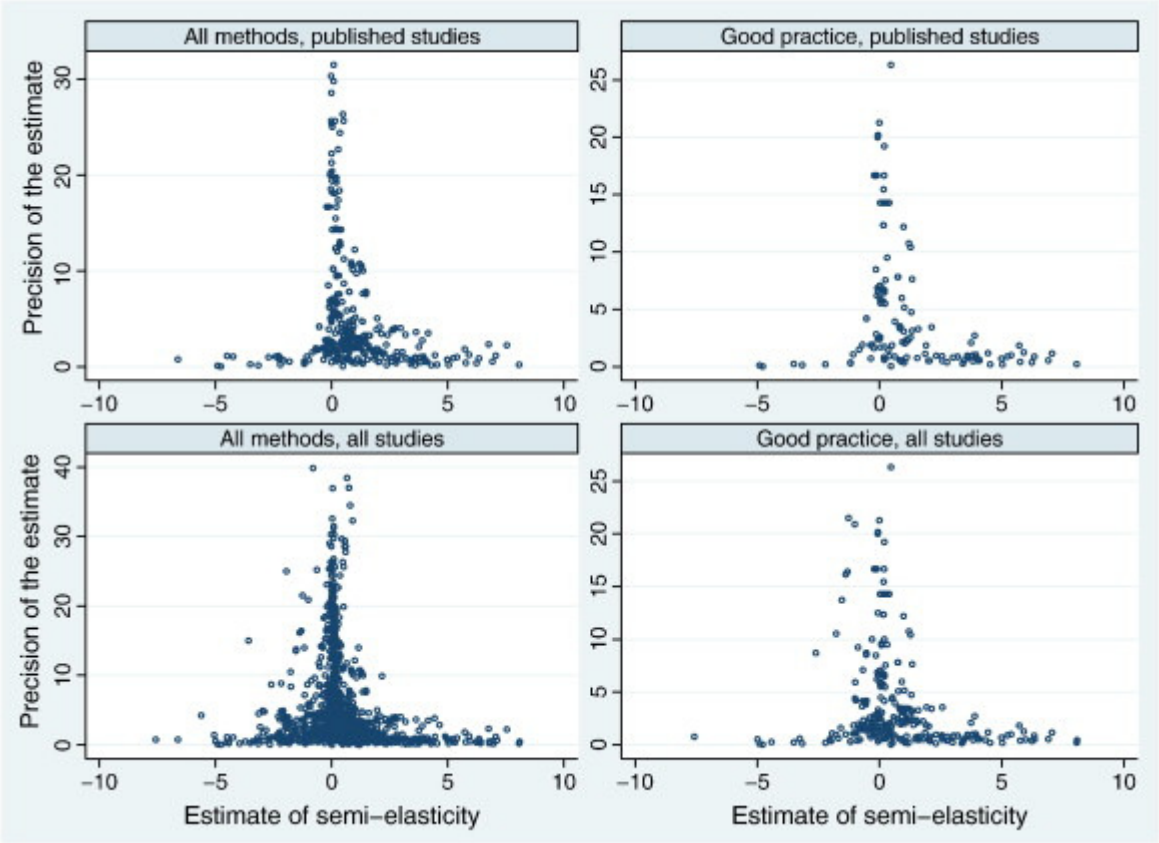
PART 1. META-ANALYSES ON DEVELOPMENT FINANCE STUDIES

Given the existence of various surveys about foreign aid (Tsikata 1998; Hansen and Tarp 2000; Easterly 2003; Kanbur 2006; Roodman 2007; Thorbecke 2007), FDI (Fan, 2002), remittances (Chami et al., 2008). We seek to provide a summary of the current state of the literature and the research in a more comprehensive and intuitive way. Therefore, we should propose an analysis that goes beyond classic literature review. Thus, the first part of this thesis applies a "meta-analysis" of the research on development finance flows, following Doucouliagos and Paldam (2010) which performed a meta-analysis on aid effectiveness studies.

Briefly, meta-analysis is the analysis of a large collection of individual studies for the purpose of integrating the findings. It goes beyond a literature review in two ways. First, it includes all the studies that meet the review criteria and is thus comprehensive. It provides a basis for understanding why evidence of impacts differs among studies, over time, and among types of interventions. Second, with a large sample a meta-analysis can make use of statistical techniques for amalgamating, summarizing, and reviewing quantitative research to overcome limits of size or scope in individual studies and obtain more reliable information about the estimated' effect. Because of these advantages, meta-analysis has become increasingly popular in economics during the last five years. To illustrate the use of meta-analysis tools, we present some results issued from meta-analyses of studies on FDI effect, which is one of most advanced economic topic in meta-analysis (Gorg and Strobl, 2001; Meyer and Sinani, 2009; Havranek and Irsova, 2010; Havranek and Irsova ,2011).

Meyer and Sinani (2009) have examined studies on productivity spillovers effect from FDI. Havranek and Irsova (2011) build also a meta-analysis on the same topic. To examine these

vertical spillovers in a systematic way, they collected 3626 estimates of spillovers and reviewed the literature quantitatively. The construction of the database is the most important step in meta-analysis. They need to collect all known published and unpublished empirical papers that estimate FDI spillovers by the sensitivity of local firm's productivity to the presence of FDI in industry. EconLit and other internet databases are helpful to find the papers, using keywords related to the topic. The collected estimates of the effect reported in studies are summarized with statistical tools that serve to analyze the estimates. For example, the figure below represents a funnel plot.



Source: Funnel plot from Havranek and Irsova (2011)

The funnel test helps to find out if the research is oriented toward a specific result and why. Meta-analysis indicates that journals select relatively large estimates for publication as we can see on the funnel plot graph. Furthermore, meta-analysis helps to test specification characteristics, for example Havranek and Irzova (2011) show that cross-sectional and

industry-level studies are likely to find relatively strong spillover effects, and that the choice of the proxy for foreign presence is important. Meyer and Sinani (2009) confirm that productivity spillovers are related in a U-shaped form to the host country's level of development in terms of per capita income, human capital and institutional development, while trade openness has a positive effect. Such results have implications both for economic policy and for the design of future empirical studies.

Chapter 1.Aid, Policy and Growth:*A meta-analysis of conditional aid effectiveness studies*

Abstract:

About hundred studies have investigated the effect of foreign aid on growth with heterogeneous findings. This paper uses meta-analysis to examine the hypothesis that aid is conditionally effective. Therefore, we collected estimates of fifty studies analyzing conditional models where aid effectiveness depends upon a conditional variable. The hypothesis that there is no effect of aid on growth is easily rejected. We find that good policies positively influence the effectiveness of aid, and on average aid works, but with diminishing returns. We have also established the presence of publication bias, but it does not seem to undermine the genuineness of estimated effects.

JEL Code : F35, O1, O4

Keywords: *conditional aid effectiveness, meta-analysis, results heterogeneity, publication bias*

1.1 Introduction

Does aid promote economic growth? Interest in this question has been growing, especially recently, which is boththe best andworstfordevelopment aid (Heller, 2011). After sinking to new lows in the 1990s, large infusions of aid to developing countries have been recommended as a means of escaping the poverty trap, and promoting development (Sachs et al., 2004; Sachs 2005a, 2005b). Major efforts are underway to mobilise resources for scaling up aid. New initiatives have been developed by emerging donors and private philanthropists, and the international community have agreed on a set of targets, the Millennium Development Goals (MDGs). Despite this revival of momentum for promotion of growth in developing countries, doubts about aid effectiveness are sustained by the weak performance of recipient countries (Easterly, 2007a, 2007b; Rajan and Subramanian, 2008). An intermediate position in this debate is that the growth enhancing effects of aid work under specific conditions; macroeconomic policies (Burnside and Dollar, 2000), structural characteristics (Guillaumont and Chauvet, 2001), or quality of institutions (Collier and Dehn, 2001).

Since the work of Burnside and Dollar (1998), empirical research has investigated theconditions which favortheeffectiveness of aid. In total the group of conditional aid studies had grown to about 50 papers at the end of 2010. After more than a decade of intense analytical work using new theory, new data, and new empirical methodologies, the conditional aid effectiveness literature (CAEL) remains divided about the impact of aid on growth and the conditional factors. Like other authors we think that the striking heterogeneity in this literature requires a systematic survey. Thus, following Doucouliagos and Paldam (2010) (henceforth referred to as DP10), we have used a meta-analysis approach[1].

Meta-analysis, a quantitative method of synthesis of research, consists of a set of statistical techniques which can be used to compare and/or combine the outcomes of different studies,

[1]See Stanley (2001) for details

with similar characteristics or with differing characteristics, that can be controlled for. Meta-analysis was originally developed in psychology, and later on extended to fields such as biomedicine and experimental behavioral science, specifically education, but is now increasingly used in economics as well (see Card and Krueger, 1995; Smith and Huang, 1995; Ashenfelter et al, 1999; Stanley and Rose, 2005; Doucouliagos and Paldam, 2008; Havranek and Irsova, 2011). Meta-analysis is not just a quantitative literature review, but can also be used to pinpoint critical aspects for the future development of theory (for example, type of data, model specification, estimation methods, and so forth). Throughthe meta-analysiswewill be ableto be conclusive abouttheempirical effectof aid,andthe importanceof the macro-economic and the institutional conditions which determine itseffectiveness. Therefore we can test the hypothesisofconditionaleffectivenessof aid which was introduced byBurnsideand Dollar in 1998,using informationavailablein thefiftyempirical studies which have examinedthis issue.

If meta-analysis becomes a widely used instrument in economic research, there are still some misunderstandings and issues about his methodological framework, as shown by the Mekasha & Tarp (2013) vs. Doucouliagos & Paldam (2013)' debate about meta-analysis results on aid effectiveness in DP08. The debate relies on the measure of the effect of aid on growth and the treatment of heterogeneity in meta-analysis. We are not going further on this debate because dealing here only with conditional aid studies we do not have measurement effect issues. Nevertheless, we think that it must be important to mention this controversy in so far as it has influenced some methodological choices (selection criteria and estimation method) in this paper.[2]

[2]Mekasha and Tarp (2013) critise the measure of aid effect, the treatment of heterogeneity and the use of the fixed effects estimator in DP08 meta-study. In response, Doucouliagos and Paldam (2013) manage to show that their critiques are comprehensive but invalid and all rely on misunderstandings of Mekasha and Tarp (2013) about the results.

Doucouliagos and Paldam (2010) use a data collection of 40 conditional aid studies to perform their meta-analysis with the purpose of finding out if the specific conditions[3] for aid effectiveness which have been discussedsince 1998, have been established empirically. Thus, they study the validity of the main conditionality models. Our paper is in line with DP10 since we follow their analytical framework and nomenclature. However, we propose to improve their analysis in several ways. First, we use a reduced database of 30 comparable studies that includes recent empirical papers, secondly we use a Random effect meta-regression and Bayesian averaging model, instead of the probit model used in DP10, using real estimated coefficients instead of binary dummy variable reporting only the significance of coefficients. Thus, the first step of our contribution lies in better exploitation of the available information contained in studies selected for the metanalysis. Indeed, with more comparable studies our analysis should be more robust; moreover our Bayesian framework allows us to use the available information in a better way. The combinationof the Bayesian approachto meta-analysis will also allow usto overcome somelimitations oftraditionalmeta-analysis,especially the presence of unexplained heterogeneity and uncertainty. We will return to these aspects later in this paper.

Given the important implications of DP10 about the ineffectiveness of aid, we decide to see if their findings are not dependent of their empirical strategy. This study aims also to complete the meta-analysis of DP10 by focusing on another value added of meta-analysis that consists to pinpoint the methodological and econometrics practices influencing results in aid-growth studies. DP10 was centered on political and policy related implications of their MRA results. To summarise, in this paper,we seek first to determine if there is an empirical conditional

[3]DP10 distinguish between a condition that enters multiplicatively with aid and the control set that controls the estimate of country heterogeneity and other ‘‘disturbing’’ factors. In growth empirics the term conditional normally means that the estimate contains a set of variables, which control the relation for country heterogeneity. This paper uses the word in the aid policy sense.

effect of aid on growth. Next we explain the factors behind the heterogeneity of results on aid effectiveness,and their consequences for future models.

The remainder of this article is structured as follows. Section 2 presents conditional aid models, and the issues behind heterogeneity in the studies' findings. Section 3 explains the meta-analysis approach and the meta-results. Section 4 offers conclusions and discusses the interest of such analysis.

1.2. Conditional Aid Effectiveness Literature

1.2.1. Conditional aid effectiveness estimates data set

Studies in CAEL[4] consider the following growth regression:

$$G = \beta_0 + \beta_1 * aid + \beta_2 * (aid * X) + \beta_3 * Z + \varepsilon$$

where X can be aid, policy or institutional controls and *Z* is a vector of other explanatory variables. When the "condition" is aid itself, we have the *Medicine Model* developed by members of the Danish Aid Agency. The idea is that aid works if given in moderation, and harms if taken in excess, just like most medicine. Burnside and Dollar (1998) and the World Bank developed the *Good Policy Model* where aid effectiveness depends on countries' policy environment.

The last group of studies regarding CAEL is the *Institutions model*. In these studies authors investigate various institutional and structural characteristics that could affect the impact of aid on growth: *External vulnerability* (Guillaumont and Chauvet, 2001)*, GDP* (Bowen 1995; Svensson 1999); *Democracy* (Svensson 1999; Kosack 2002; Knack 2009); *Quality of institutions* (Collier and Dehn ,2001; Collier and Dollar 2002); *Trade openness* (Teboul and Moustier, 2001); *Economic freedom* (Brumm, 2003); *Political instability* (Chauvet and Guillaumont, 2004). Following DP10, we agree that this group is too small and too heterogeneous to be part of a formal meta-analysis[5]. However, unlike DP10, we do not remove these studies from the meta-study because we choose to use an empirical framework which can use the information they contain (Bayesian Framework).

[4]Studies in CAEL are divided into three groups.
[5]Details in the appendix.

Literature Sampling and Combining Estimates

The data used in this paper originate mostly from 40 published and unpublished aid–growth studies identified by DP10 exploring conditional aid effectiveness. We employed the following strategy for studies inclusion. After reviewing the DP10 database and added few recent empirical studies, we elaborated a baseline selection query that was able to capture most of the relevant studies. Studies that failed to satisfy one or more of the following criteria were excluded from the meta-analysis. First, the study must include a Good policy model, a Medicine model or an Institutions model. Second, the dependent variable in regression must be the GDP growth rate and the studies must report estimations based on a panel data (with 15 years at least). Third, the study should be available online. We also excluded country case studies and sectoral studies. This strategy provided 30 prospective studies, which were all examined in details (62 estimates for Good Policy models, 45 estimates for Medicine models). Results of Institutional models are used for the belief in prior distributions in Bayesian analysis.

For each reported regression in the primary studies, we recorded an estimate of the conditional effect of aid on growth and its associated standard error, degree of freedom, and so forth. In addition, we recorded authors and publication details, characteristics of the original dataset (use of sub-sample, numbers of countries, and so forth), the level of aggregation (countries or regions), initial year of the sample and the number of observations, and regression characteristics, such as the type of estimator, and the type and number of conditioning variables included in the regression. The total number of observations in our database is 113, each corresponding to a regression, provided by the 30 separate studies.

1.2.2 What explains differences in conditional aid effectiveness estimates?

Conditional aid effectiveness literature contains many stories of how foreign aid affects economic growth: aid raises growth…. "in countries with good policies", or "in countries with difficult economic environments", or "mainly outside the tropics", or "usually, but with diminishing returns"... The diversity of these results suggests that many are not robust (Roodman, 2007).

Among the numerous studies of CAEL, the contribution by Burnside and Dollar (1998) came to exert a significant influence on policy: aid has a positive impact on growth in developing countries with good fiscal, monetary and trade policies; but in the presence of poor policies, aid has no positive effect on growth. However, these results were subject to criticism, and this challenge was seen in the Conditional Aid Effectiveness Literature[6].Hansen and Tarp (2001) found that, on average, aid works, but with diminishing returns. Guillaumont and Chauvet (2001) offered evidence that aid works best in countries with difficult economic environments, such as those characterised by volatile and declining terms of trade, low populations, and natural disasters. In the same vein, Collier and Dehn (2001) found that *increasing* aid cushions countries against negative export price shocks. Collier and Hoeffler (2004) applied the good policies argument for aid in post-conflict countries. These studies are different in their findings, but also often in their methodological choices.

[6] Arndt et al (2010)

(1)Methodological choices

The choiceofthe conditionandtheinterpretationofthe non-linearity of Aid-Growth leads to thecategorizationidentified byDP10(Good Policy, Medicine, institutional). We are concerned bythe heterogeneity of the studiesineach of these families, in their conclusions,but also in theirmethodologicalframework.

First, there are differences in sampling and lengths of study periods that raise the question ofthe homogeneity of the effect of aid, as discussed by Mekasha and Tarp (2013). Assuming that the effectiveness of aid is conditional means that the effectof aid is not a constant, but a function of factors. Thus, variation in length of study periods and sampling will influence not only the sign of the impact, but also its magnitude. Moreover, calculation methods and model specifications (controls, transmission channels, and so forth) also affect the results, as well as affecting the treatment of the endogeneity of aid, for which an appropriate solution has not yet been found.

It also raises issues about the ability of econometrics to make valid causal inferences with respect to complex aggregate phenomena such as the determinants of economic growth (Arndt et al, 2010), or because of timing of causal relationships between aid and growth (Clemens et al, 2011). For example, in the treatment of endogeneity, there is an increasing awareness that dynamic panel (system) GMM methods, frequently employed for robust estimation, are not a panacea[7], because under some conditions they lead to results which are even more biased than OLS or panel FE estimates.

[7] Details of this issue are presented in Arndt et al (2010)

(2) The Importance of Publication Bias

Arndt et al (2010) perform a review of aid effectiveness literature in which they identify a new group of studies, whose only distinctive aspect, is the view that the impact of aid on economic growth is non-existent. DP10 (and previously DP08) also argue this pessimistic conclusion, and talk of a zero correlation result[8]. In their workthey consider thatgiventhe particular issues indevelopment aidthe zero correlation result was seen as highly undesirable, and the search for models that allow a nicer story to be told, led to the development of CAEL , and the high heterogeneity of findings. What is more, the real contribution of DP10 is to give a reflection on the research process and researcher's interactions with their environment and their personal motivations. The issue of publication bias implies a tendency for published papers to exhibit statistically significant results for the main variables of interest. This phenomenon may occur either because of self-censoring by authors, or because editors of journals make publication decisions partly based on levels of statistical significance.

1.3.Meta-Analysis in Practice

The above discussion has pointed out the fact that both theoretically as well as empirically, there is a lack of clear-cut evidence about the conditions that determine aid effectiveness. This section aims to test the conditional aid effectiveness theory, and take the descriptive analysis in the previous sections one step further, by considering the relevance of several sources of heterogeneity in the results of previously released studies by using meta-analysis tools.

[8] The Zero correlation result means that the aid's aggregate impact on economic growth is non-existent.

The meta-analysis used in this study is a set of techniques divided into two groups. The first group of techniques is used to determine the true empirical findings about the research question submitted, and we investigate if there is an empirical conditional aid effect beyond the publication bias. The second phase is to determine, for future studies, the main issues to consider when using an Aid-Growth model.

1.3.1.True empirical effect and publication bias

Naturally the first question is what the combined estimates of all the studies tell us about the conditional aid effect on growth hypothesis. To be sure that the empirical effect adequately represents the true underlying size of the effect between aid and growth, we need to know whether it is genuine, or an artefact of the publication bias.

An arithmetic average of the results reported in the CAEL will be a biased estimate of the true effect, if some results are more likely than others to be selected for publication. Publication selection bias is an important issue for research validity. If the CAEL is free of publication bias, the reported results of the Good Policies, Medicine and Institutions models will be randomly distributed around the true effect. If, in contrast, some results fall into the "file drawer" (Rosenthal, 1979) because they are insignificant, or have an unexpected sign, the reported estimates will be correlated with their standard errors.

In practice, two tools are used for this analysis. Firstly, we use Funnel Plots, which are graphical images used to illustrate the relationship between treatment effect estimates in individual studies (plotted on the horizontal axis), and a measure of study precision (plotted on the vertical axis), to make a preliminary examination of the presence of publication bias. Secondly, we use the MST-FAT tests:

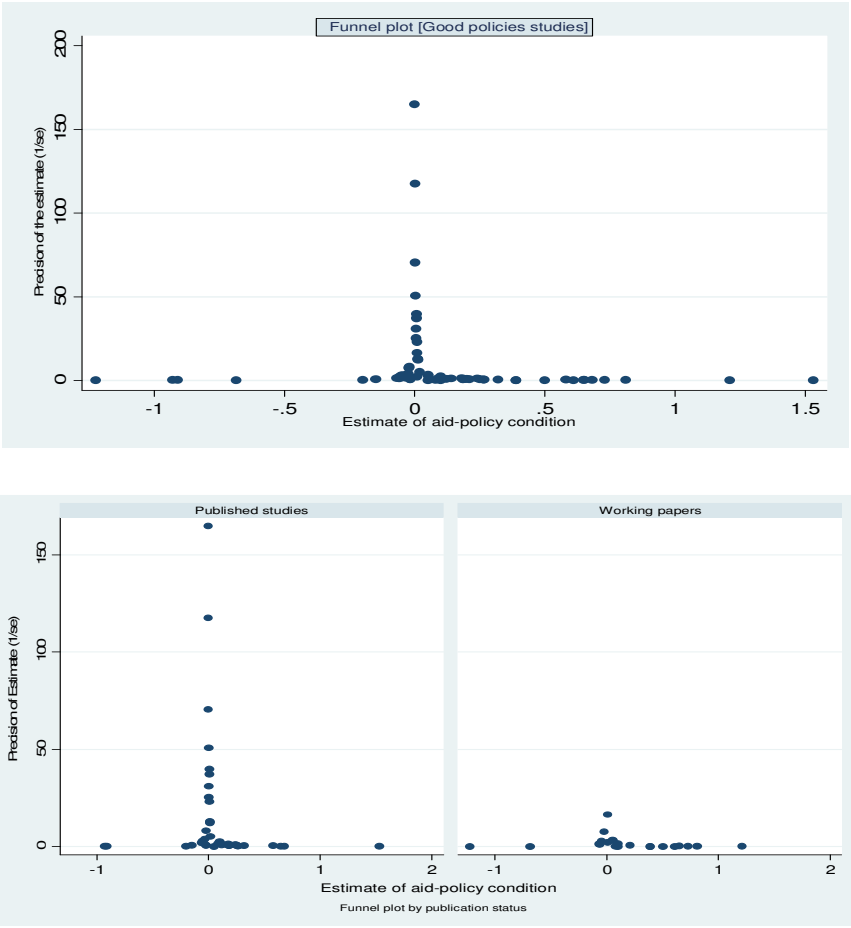
$$\ln|t_i| = \alpha_0 + \alpha_1 \ln df_i + u_i \qquad (MST)$$

$$t_i = \varepsilon_i / s_i = \alpha_2 + \alpha_3 \left(1 / s_i \right) + v_i \qquad (FAT)$$

The main idea behind these tests is that, if a statistically significant effect is required, an author may re-run calculations, specification search, and/or data adjustments until the result becomes statistically significant. The meta-significance test (MST) verifies the authenticity of empirical effects by analysing the relationship between the natural logarithm of the absolute value of a study's standardized effect (t-statistics) and its degrees of freedom (df). As the sample size for the i^{th} study rises, the precision of the coefficient estimate for the i^{th} study rises also, that is, standard errors fall and t-statistics rise. Stanley (2005) showed that the slope coefficient in the MST equation offers information on the existence of genuine empirical effects, publication bias, or both. If $\alpha_1 < 0$, the estimates are contaminated by selection effects: studies with smaller samples report larger t-statistics. If $\alpha_1 > 0$, there is a genuine association between aid, policy condition and economic growth.

The Funnel Asymmetry Test (FAT) shows the presence of a genuine empirical effect outside any publication bias. If there is a publication bias, α_3 will be statistically significant and α_2 the expression of a genuine empirical effect (corrected for publication bias).

Figure 1. Funnel plots



In Figure 1, we present a funnel plot, which is done using inverse of standard error as the measure of accuracy. As can be seen from this funnel plot, the estimates from the Good Policy models[9] are fairly randomly distributed. Although the distribution of the studies to the right of the funnel seems relatively more concentrated for working papers, there is no clear asymmetry.

[9]Because of data, we present only funnel plots for Good Policy models.

Table 1: Meta-significance and funnel asymmetry tests, aid-growth conditionality effects

	MST	**FAT**
Dependent variable	*Ln|t|*	*t-statistics*
	Good policy model	
constant	0.84 (0.78)	**1.25*** (10.18)**
Ln|*df*|	-0.16 (-0.73)	
1/SE		**0.001** (2.22)**
R^2	0.02	0.047
N	65	65
	Medicine model	
constant	-1.70 (-1.06)	**2.07*** (8.38)**
Ln|*df*|	0.44 (1.46)	
1/SE		**-0.0012* (-1.85)**
R^2	0.10	0.072
N	47	47

Note: t-statistics in brackets, using robust standard errors.

Comments: If aid interaction terms have an effect on growth, ln(df) in the MST should have a positive and statistically significant coefficient. This fails for both models. If the literature is free of publication bias, the constant in the FAT should not be statistically significant.

The 1/SE term is a measure of the existence of a genuine empirical effect, corrected for publication bias. For both models, FAT test identifies a true empirical effect of conditional aid effectiveness.

If aid interaction terms have an effect on growth, ln(df) in the MST should have a positive and statistically significant coefficient. This fails for both models. If the literature is free of publication bias, the constant in the FAT should not be statistically significant. However, the estimated effects corrected for publication bias (the slope coefficients reported in Table 1) are significant for Good Policy and Medicine models. For both models, the FAT test identifies a true empirical conditional effect of aid.

To sum up, when the existing empirical evidence is analysed, the results suggest that in countries with a good policy environment aid has a positive impact on growth, but with

diminishing returns.Unlike some meta-studies, we do not use the slope coefficients to give the value of the aid impact, but to get information about empirical evidence beyond potential publication bias. It would be hazardous to try to draw any other conclusions from the meta-analysis at this stage.

1.3.2. Meta-regression Analysis (MRA): Explaining heterogeneity in the results

The previous analysis shows that the research environment could influence the results, now we need to point out methodological choices that matter in CAEL, and explain the large heterogeneity. It has become standard practice to use a multivariate meta-regression. Technically speaking, it is a regression where the dependent variable is a summary statistic, perhaps a regression parameter, drawn from each study, while the independent variables may include characteristics of the method, design and data used in these studies. Following, Stanley (2001) we use a random effect model contrary to the Probit model in DP10 which MRA is based on measures of whether the empirical results were significant or not instead of measuring the magnitude of the results:

$$\theta_i = \alpha + \gamma_1 X_{i1} + \cdots + \gamma_k X_{ik} + \delta_1 K_{i1} + \cdots + \delta_n K_{in} + u_i \quad \text{(MRA)}$$

whereθ_i is the standardised effect derived from the i_{th} study ,X_j are dummy variables representing characteristics associated with the i_{th} study,K_j are continuous variables associated with the i_{th} study,γ and $\delta$are the unknown regression coefficients, and u_i is the disturbance term, with usual Gaussian error properties. Seems like a lot of information would be lost based on making the data discrete instead of incorporating the magnitude of the results. We understand there might be difficulties in using directly the coefficients from the studies and I

assume this is why DP10 did not use them. However, we believe that our inclusion strategy and the moderator variables of the MRA help to circumvent those problems.

The regression coefficients in MRA quantify the impact of specification, data and methodological differences in the reported studies' effects (γ,δ). For example, because the size of datasets used by primary studies varies substantially, we control for the number of years and countries in the sample, to find out whether smaller studies report systematically different outcomes. We include the average year of the data period to control for the time periods used to capture the effects of aid. The other moderator variables of our MRA are related to publication details of the study (such as publication status, or year of publication), author's information (such as institutional affiliation), and estimation methods.

We also apply Bayesian Model Averaging using Institutions models results as priors, in order to define the relevant moderator variables because there is no theory that would help us decide which variables should be included in the meta-regression model. The moderator variables of MRA are defined by groups in relation to the personal characteristics of the author (institutional affiliation), data (level of aggregation), the methodological choice or estimation techniques (control of heterogeneity and endogeneity). They contribute in their own way to the heterogeneity of results. However, there are two kinds of uncertainty to deal with: influence of selected variables for our model, and their relationship with our variable of interest. Hence, if they are not included, it might be interpreted that they are simply missing variables, or missing variables which lead to an omitted variable bias.

Table 2: Differences in studies' characteristics

Variable	Description
Dependent	BD if study reports significantly positive effect θ
DevJour	BD if published in development journal
Stars	Level of significance of aid-policy effect
AidBus	BD if author(s) employed/affiliated with aid agency
WorldBk	BD if paper from World Bank group
Danida	BD if paper from Danida group
NrCountries	Number of countries included in the sample
WorPap	BD if the research has yet to be published in journal
NrYears	Number of years covered in the analysis
Endo	BD if the aid was treated as an endogenous variable
EDA	BD if paper use EDA measure of assistance
Region	BD if paper controlled for regional effects
Subsample	BD if estimate relates to sub-sample of countries
Reproduce	BD if estimate is an attempt to replicate results
Fixedeffects	BD if Fixed Effects estimator used
Ethnic	BD if controlled for ethnic fractionalization
Polmeasure	BD if a Burnside-Dollar type measure of policy used
Finmarkets	BD if controlled for financial markets development
Institutions	BD if controlled for quality of institutions
Aidsqr	BD if included aid*aid term
AidSqr*Policy	BD if included aid*aid*policy term
Instability	BD if paper controlled for political instability
Transmission Channels	Number of transmission channels controlled in the analysis
Decoup	Period used (N- year average)

BD= binary dummy. It is 1 if condition is fulfilled, otherwise 0.

Meta-analysis consists of collecting information in previous empirical studies to test a proposition (here about conditional aid effectiveness) in order to confirm it or not. Therefore, the challenge is to use the collected information as well as possible. Using Bayesian estimation framework within our meta-regression analysis enables the uncertainty in the distribution of variables and the functional form of the model to be taken into account more appropriately. Moreover, our Bayesian MRA also uses the information from studies excluded in a classical meta-analysis approach, such as the Institutional Model studies in DP10. Indeed, we use this additional information to construct prior estimates[10] (model calibration) for our Bayesian estimation. We therefore obtain estimates that are more informed and more accurate. The Bayesian MRA procedure is detailed in the appendix.

1.4.Interpretation of MRA Results

We begin our analysis with the multivariate MRA by including all explanatory variables presented in table 2in the regression. This general model includes 24 variables clustered by categories: author's background, data characteristics, estimation methods, publication outlet, and control and specification choices. For the method and specification variables, no theory exists to determine which of them are important, and what sign they should have. Thus, following DP10 we include all variables in the regressions: the results for the classic MRA are reported in the first column of Table 3.

For the specification reported in Column 2 of Table 3, we used the Bayesian MRA. To perform the Bayesian estimation we need the prior information for the parameters, to calibrate

[10]TheBayesian estimationis doneby multiplyingthe prior distributionbythe likelihood functionof data. This prior density functionrepresents theavailableinformationon model parametersbeforeusing the datainthe likelihood function.

our model before the simulations. We generally have the choice between non-informative prior or informative prior[11] information (see Table 4). We always perform our calculation for two cases, but we have only reported those that used the information given in the studies of the Institution model group not included in our metadata.

The results in table 3 show that publication status of studies, the nature and level of aggregation of data, and the inclusion or omission of important controls in the analysis make a difference to the findings. However, we noted that classic MRA detects the author affiliation effect, whereas the Bayesian MRA focuses on estimation techniques and the treatment of endogeneity of aid. Ourcomments will focuson the Bayesian resultsthat we findmost appropriate.

Our discussion here is structured around four important issues on which previous authors have made assumptions without enough empirical assessment: measurement of aid flows, period averaging, treatment of endogeneity and inclusion of transmission channels.

[11]Table 4 illustrates improvement in estimation with a comparison of BMRA results which have with different information about prior distribution, from the non-informative priors - used if nothing is known about the value of a parameter - to objective informative priors - based on previous meta-studies and studies not included in our data. Table 4 shows the gain in level of certainty in estimation.

Table 3: Method Heterogeneity in conditional aid effectiveness studies

	Classic Multivariate MRA	**Bayesian Meta-Regression Analysis**
Variable		
Authors details		
Danida	-0.002 (-0.54)	-0.07 (0.11)
WorldBk	0.34***(2.46)	0.15 (0.12)
Estimation methods		
Fixedeffects	-0.091 (-1.39)	**0.22 (0.039)**
Endo	-0.004 (-0.86)	**0.24 (0.031)**
Publication outlet		
Reproduce	-0.088 (-1.51)	**-0.11 (0.038)**
WorPap	0.42 (1.56)	**0.42 (0.028)**
Devjour	0.76** (1.90)	**0.56 (0.079)**
Data differences		
Polmeasure	-1.25* (-1.75)	-0.77 (-0.11)
NrCountries	-0.024** (-2.46)	**-0.01 (0.002)**
NrYears	0.022 (0.76)	**0.008 (0.007)**
Subsample	-0.39** (-2.50)	**-0.127 (0.060)**
Eda	0.50 * (1.72)	**0.35 (0.032)**
Specification and controls		
Ethnic	-1.04 (-0.77)	-0.74 (0.25)
Transmission channels	0.39 *** (2.84)	**0.328 (0.03)**
FinMarkets	1.15** (2.10)	1.13 (0.50)
Aidsqr	0.68 (1.39)	0.71 (0.155)
Instability	-0.38 (-1.06)	-0.80 (0.153)
Decoup (Period Averaging)	-0.04 (-1.66)	**0.038 (0.022)**
N	65	65
R^2	24.51	-
Studies used	28	28

Notes: Robust t-statistics in parentheses for classic MRA and level of uncertainty for Bayesian MRA. (For the Good Policy studies)

Estimation details: Classic MRA=Random-effects model. The stata's module "Metareg" performs meta-regression analysis.

1.4.1. Measuring aid flows

The first issue is in the measurement of aid itself. All the studies take total aid received as a share of recipient GDP. However, there are different measures for aid flows. Burnside and Dollar (1998), Collier and Dehn (2001), and Dalgaard, Hansen, and Tarp (2004) for example,

use Effective Development Assistance (EDA)[12], while the others use net Official Development Assistance (ODA). It is commonly thought that switching from one to the other may not stress results much because the two are hugely correlated[13] (Roodman 2007, Dalgaard and Hansen 2001). Our MRA variable "EDA" tests this assumption, and finds that the choice of measure of aid flows matters.

The concept of net ODA flows, as defined for the last four decades by OECD, and used in most of the papers, obscures its heterogeneous composition by including elements which do not correspond to a transfer to "recipient countries" (For example the cost of "sponsored" foreign students) (Guillaumont, 2009).

EDA is different from ODA in that the official loans component is replaced by the grant equivalent of official loans, and it disregards grants that are tied to technical assistance. The main difference between EDA and ODA is that EDA is the sum of grants and the grant equivalents of official loans, whereas ODA includes both direct grants and the concessional loans for which the grant component is above 25 per cent. The EDA measure provides a better picture of resource flows than ODA. The significance and sign of the dummy variable "EDA" parameter show that the use of EDA data improves the analysis of aid effectiveness.

1.4.2. Length of periods studied

Aid-Growth models generally use a 4 or 5-year period average growth rate. On the other hand, key cross-section studies in the growth literature use periods of 10 to 25 years, despite

[12] Burnside and Dollar were the first to use a new database on foreign aid compiled by Chang et al. [1998] for the World Bank.

[13] Dalgaard and Hansen (2001) showed that the Pearson correlation between nominal ODA/GDP and nominal EDA/GDP is 0.98, and the correlation between nominal ODA/GDP and real EDA/GDP is 0.95 [see also Roodman (2007)].

the small samples which result: Barro (1991), Mankiw, Romer, and Weil (1992), Sachs and Warner (1995) (Roodman 2007). Easterly, Levine and Roodman (2004) noted that "this literature has the usual limitations of choosing a specification without clear guidance from theory". Indeed, it would make more sense for studies claiming to have the aim of capturing the impact of aid on growth, to use longer periods, as for example Guillaumont and Chauvet (2001) who used a 12-year period. This confirms by the significance of the variables "*Decoup"* and "*Nryears"*, which express the fact that studies using longer periods measure the effect of aid in the conditional models better.

1.4.3. Simultaneity and Endogeneity

One of the most difficult issues for aid studies is the endogeneity of aid variables. Since the late 1990s, instrumental variables and GMM methods have proliferated as prominent features to adequately deal with the growth regression for the endogenous response of foreign aid to economic growth. However, authors like Roodman (2009) warn about the automatic use of these methods, because they do not provide a definitive answer to these problems. As Deaton (2009) argued, few studies have dealt with the endogeneity of aid in a convincing manner. The treatment of the endogeneity of aid (and other capital flows) in growth models has not yet been resolved in a satisfactory way and remains an important issue. However, the treatment of aid endogeneity and heterogeneity in conditional aid models provides a bettermeasure of the effect,as indicated by the dummy variables "endo" and "fixedeffects" which have an uncertainty lower than 3 per cent.

1.4.4. Transmission channels

This variable represents the number of transmission channels considered by the author. The significance of this variable in our MRA recalls an issue, already highlighted by Gomanee and Morrisey (2005), concerning the necessity of explaining the transmission channelsin Aid-Growth models. Indeed, as we saw above, in a cross-country context, specification seems to matter. However, other than including aid as an explanatory variable in the growth regression, these studies do not attempt to specify and test the mechanism by which aid impacts on growth. Specific mechanisms through which aid can affect growth also help to deal with reverse causality Gomanee and Morrisey (2005).

1.5. Conclusion

Our meta-analysis of 30 studies from the Conditional Aid Effectiveness Literature (CAEL) concludes that good policies positively influence the effectiveness of aid, and on average aid works, but with diminishing returns. We have also established the presence of publication bias in CAEL, like in previous meta-analyses of aid literature, but it does not seem to undermine the real positive and significant effect of aid on growth.

The Bayesian approach of meta-analysis allows more certainty about the relevant moderator variables and the findings about methodological choices for empirical studies in CAEL. The BMRA gives the value of parameters with an average uncertainty of 5 per cent. Posterior distribution illustrates how objective prior information and a better control of all kinds of uncertainty in model formulation make Bayesian inference better for this analysis. Using prior information about the value of parameters, BMRA works better and gives clearer results than in "classical" meta-analysis (like that of DP10). We were therefore ableto test the methodological choices (made by the authors often without theoretical justification), and which cause huge discrepancies in the findings about the effectiveness of aid. We found that the measure of aid flows (EDA vs ODA), the length of the period of the sample used to capture the impact of aid, the treatment of endogeneity of aid variables, and the specification of aid transmission channels are all important.

Appendix

Table 4:Posterior meta-distribution vs. choice of prior information

	Conjugate prior		**Informative Prior**	
Variable	PostMean	PostSTD	PostMean	PostSTD
Const	-0.05976	0.97699	0.09399	0.56759
mu	-0.03123	0.13412	-0.02971	0.03291
stars	0.09221	0.06132	0.08890	0.00664
endo	0.22990	0.17407	0.24433	0.03136
eda	0.34498	0.18905	0.35159	0.03290
ethnic	-1.04357	0.87741	-0.74094	0.25689
channels	0.37275	0.16277	0.32818	0.03035
polme	-0.75405	0.36506	-0.77010	0.11126
finmark	0.51455	7.96950	1.13611	0.50558
institut	0.40317	8.08935	-1.14233	148.37092
aidsqr	0.77097	0.53337	0.71135	0.15501
instab	-1.06024	0.59458	-0.80032	0.15303
nrcoun	-0.01514	0.00940	-0.01641	0.00201
nryears	0.01297	0.02662	0.00806	0.00700
decoup	0.06274	0.07782	0.03873	0.02211
region	0.34778	8.04664	1.16482	148.03272
subsampl	-0.12265	0.21195	-0.12773	0.06072
reproduc	-0.09887	0.20548	-0.11781	0.03876
fixeffec	0.25238	0.23114	0.22373	0.03926
worpap	0.46657	0.19649	0.42201	0.02896
devjour	0.63583	0.31655	0.56106	0.07910
aidbus	0.26278	5.58007	0.23814	0.11290
danida	-0.11258	5.58387	-0.07300	0.11709
worldbk	0.12937	5.58516	0.15159	0.12537

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Bayesian Posterior Prediction and Meta-Analysis (Moral-Benito, 2010)

Meta-Regression Analysis

The meta-regression model (known as MRA) has been developed to analyze the multi-dimensional nature of the research process. The impact of specification, data and methodological differences can be investigated by estimating an MRA of the following (linear) form:

$$\omega_i = \alpha + \gamma_1 X_{i1} + \ldots + \gamma_k X_{ik} + \delta_1 K_{i1} + \ldots + \delta_n K_{in} + u_i \qquad (1)$$

where ω_i is the standardized effect derived from the i^{th} study , X_j are dummy variables representing characteristics associated with the i^{th} study, K_j are continuous variables associated with the i^{th} study, γ and δ are the unknown regression coefficients, and u_i is the disturbance term, with usual Gaussian error properties. The regression coefficients in (1) quantify the impact of specification, data and methodological differences on reported study effects.

Bayesian Posterior Prediction

Bayesian econometrics is the systematic use of a result from elementary probability, Bayes' theorem. Suppose we have a model given by $f_y(y;\theta)$, where y represents the data and θ the parameters. The object of interest from an econometric perspective is the vector of parameters θ. The logic of Bayesian inference is to apply Bayes' theorem such that:

$$p(\theta|y) \propto p(y|\theta)p(\theta)$$

Where $p(\theta|y)$ is referred to as the posterior density, $p(y|\theta)$ is the likelihood function of the data given the parameters and $p(\theta)$ is the prior density of the parameters.

In the present case, like in most econometrics, prediction is a major concern. That is, given the observed data, y, the econometrician may be interested in predicting some unobserved data y*. In our case, the observed data y will be the different estimates of the aid-growth correlation of previous studies and their characteristics. The unobserved data y* that we want

to predict will be the true effect of aid on growth and the most prominent characteristics of a model in AEL.

The Bayesian reasoning argues that uncertainty about the unobserved elements (y* and X*) are summarized by a conditional probability statement. That is, prediction should be based on the posterior predictive density p(y*|y) given by:

$$p(y^*|y) = \int p(y^*|y, \theta)\, p(\theta) d\theta \qquad (*)$$

Meta-Analytical Bayesian Model

The combination of the two techniques described above allows us to obtain the whole distribution of the conditional aid effect on growth. The resultant procedure can be denominated Meta-Analytical Bayesian Posterior Prediction.

The method uses Bayesian methods that will allow us to incorporate uncertainty from the very beginning in a more natural way than classical approaches. Finally, given the compilation of data from previous studies and the use of statistical techniques in order to combine this information, Bayesian methodology can be thought of as a compromise between the fixed effect model and the claim that it is seldom appropriate to merge results from disparate studies. Bayesian meta-analysis considers a random effect model as in (1) but it also allows for specifying prior distributions for parameters.

I now formally introduce the methodology. We depart from a linear regression model:

$$Y_i = x_i^{'}\beta + v_i \qquad (2)$$

Where i = 1, ..., n refers to the n previous studies or regressions for which we have data. Y_i is the effect of aid on growth (ω) reported in the regression i and x_i is the k-1 vector of observable characteristics of study i. (for example the policy measure or the institution home of the author). By stacking the n observations in vectors we can rewrite (2) in matrix form:

$$Y = XB + V \quad (3)$$

Where now, Y and X are a n-1 vector and a n-k matrix of data respectively.

B is a k-1 vector of parameters and V is the n-1 vector of disturbance terms.

Given the model in (3), we can now turn to the application of Bayesian posterior prediction.

For this purpose, we follow a sequential procedure:

(i) Elicitation of the likelihood function for the data and the prior distribution for the parameters,

(ii) Given the likelihood and the prior distribution, obtain the posterior distribution of the parameters, and finally,

(iii) Obtain the posterior predictive distribution.

First, we propose to assume that the error term in (2) follows a multivariate normal distribution with zero mean and variance-covariance matrix given by $\sigma^2 N$:

$$V \sim N(0;\ \sigma^2 N).$$

The previous assumption implies that the likelihood is given by:

$$p(y|\beta, \sigma^2) = \frac{\sigma^{\frac{-N}{2}}}{(2\pi)^{\frac{N}{2}}}\left\{\exp\left[-\frac{1}{2\sigma^2}(y - x\beta)'(y - x\beta)\right]\right\} \qquad (4)$$

In many situations, when we face the problem of choosing a prior distribution for the parameters of a model, we have very little (if any) prior information for such task. As the likelihood function in (2) belongs to the family of normal-gamma distributions, I elicit a diffuse prior distribution for the parameters by assuming a normal-gamma distribution with a finite variance base on prior initial values (As the variance is a measure of uncertainty, by fixing it to infinity, we are assuming that we do not have any prior information).

Given the likelihood and prior concept proposed above, and by using Bayes' theorem as in (3), the posterior distribution of the parameters is:

$\beta, \sigma^2|y \sim NG\left(\vec{\beta}, \vec{\Sigma}, \vec{S}^{-2}, \vec{v}\right)$

Where since we have employed diffuse prior distributions, the over lined parameters of the posterior distribution are given by:

$$\vec{\Sigma} = (x'x)^{-1}$$

$$\vec{\beta} = \hat{\beta}_{ols} = (x'x)^{-1}x'y$$

$$\vec{v} = N$$

$$\vec{S}^2 = \frac{N-k}{N}S^2, \qquad S^2 = \frac{(y - x\hat{\beta})'(y - x\hat{\beta})}{N-k}$$

We are now ready to obtain the predictive distribution in which we are interested by solving the integral in (*). As shown, for example in Koop (2003), with the likelihood and the prior distributions presented above, this integral can be solved analytically. Moreover, the resultant predictive distribution is a Student's t-distribution defined by the following parameters:

$$y^*|y \sim t\left(X^{*'}\vec{\beta}, \quad \vec{S}^2\left[1 + X^*\vec{\Sigma}X^{*'}\right], \quad \vec{v}\right) (**)$$

Therefore, by simply compiling some information about omega and model variable (the X* vector) and applying (**), we easily obtain the predictive characteristics of the model in CAEL and perhaps the true distribution effect. In the application, we see the kind of information that we need depending on the availability and the value of interest.

Chapter 2.Workers' Remittances and Economic Growth: *What does meta-analysis reveal about empirical estimates?*

Abstract:

Many development economists believe that remittances inflows are an important source of funding for long run growth. Therefore, recent studies have investigated the growth enhancing effects of remittances in the recipient countries but reached different conclusions. This paper uses meta-analysis to combine, explain, and to summarise these disparate estimates of remittances effects. The hypothesis that there is a direct effect of remittances on growth is rejected but we find robust evidence that remittances have positive indirect effects on growth. Although there is evidence of publication selection, there is also evidence of a genuine estimate effect beyond publication bias. We also established some methodological rules for future studies on this issue.

Keywords: *Remittances, Growth, Meta-analysis*

2.1. Introduction

Remittances from migrant workers in rich countries are increasingly important to developing countries. Total official remittances to developing countries amounted to $240 billion in 2007, up from $31.2 billion in 1990. It has become difficult for financial markets and governments to ignore the power of remittances. Because remittances now make up a significant proportion of the GDP of many developing countries, some researchers and policymakers believe that emigrant remittances could play the same role in economic development as Foreign Direct Investment (FDI) and other capital flows. Since the financial crisis, the number of research papers has risen more than 100 per cent, with the motivation being that if remittances can be better understood, then perhaps they can either be shown to promote development on their own, or they can be channeled into productive investment by wise policies.

If remittances are like other capital flows, it would be expected that remittances would have a positive correlation with output growth. At the same time, remittances have significant indirect and direct macroeconomic effects (Rao and Hassan, 2011). Remittances, by reducing volatility, indirectly increase growth rate (Ramey and Ramey, 1995; Hnatkovska and Loayza, 2003; Chami et al, 2008). Other studies have found that remittances indirectly increase growth rate by speeding up the development of the financial sector (Aggarwal et al, 2010). If some researchers think that remittances may have a positive effect, other researchers conclude that, at best, remittances have no impact on economic growth. In fact, remittances could have a negative effect on growth rate through, for example, exchange rate appreciation (Amuedo-Dorantes and Pozo, 2004; Lopez, Molina, and Bussolo, 2007; Acosta, Lartey, and Mandelman, 2007; Lartey, Mandelman, and Acosta, 2008). Other indirect effects of remittances on growth work through development of human capital, labor force and investment. This obvious heterogeneity inthe findingsis also found inthe analysisofdirect effects.Indeed, some studies have tried to estimate the direct growth effects of remittances by

performing a regression of growth rate on remittances and a set of control variables, but have reached different conclusions. Barajas et al (2009) and Rao & Hassan (2011) found that these direct growth effects are insignificant or even negative, whereas Pradhan et al (2008), Giuliano & Ruiz-Arranz (2009) and Fayissa & Nsiah (2010) found them to be positive.

Thus, our analysis tests this hypothesis: Remittances have a positive and significant effect on growth. Rather than test this hypothesis on a single country, or with a panel of aggregate data on remittances, like the previous studies, and then continue to reflect the ongoing heterogeneity in our results, we choose to use an alternative strategy to disentangle the debate about remittances. To take a step beyond single-country case studies and establish robust evidence for remittances effects, we employ meta-analysis methodology (Stanley, 2001). In fact no systematic survey has been done yet to establish robust evidence about the growth enhancing effect of remittances.

Indeed, using meta-analysis we will be able to be conclusive about the empirical effect of remittances.We can therefore test the hypothesis of the positive correlation of remittances with economic growth, using information available in the twenty–one empirical studies that have examined this issue.

To our knowledge, our paper provides the first meta-analysis in the economics of remittances. Meta-analysis, in various ways, better reflects the econometric, statistical and data challenges faced in this type of research. In doing so, we address two main research questions that are common to any standard meta-analysis (i) What explains the heterogeneous findings about the macroeconomic effects of remittances? (ii) How conclusive is the empirical evidence on the growth effect of remittances? The validityof our meta-analysis resultsalso depend onhow they take into account the quality and stability of the analytical framework and findings reported by authors, when we collect our data. Therefore, we adopt an empirical strategy to control the internal quality of studies included in our meta-analysis

The aim of this paper is to find what we really learn from the research on emigrant remittances, and describe using meta-analysis the prominent characteristics of research on remittances in order to prevent the disaster that happened in the past in other Economics fields, like the aid effectiveness literature. This paper uses meta-analysis to uncover the econometric, statistical and political challenges faced in this field. In doing so, we address several questions. First, we want to identify characteristics (methodological approaches, model specifications, authors' affiliation or data differences) which influence empirical findings. Then, we want to find the 'True' empirical effect reflected by this literature.

The remainder of this article is structured as follows: Section 2 presents Remittances/Growth models, and the issues behind the heterogeneity in studies' findings. Section 3 explains our meta-analysis approach and presents data. Section 4 is a discussion of the meta-analysis results. Section 5 offers conclusions.

2.2. Remittances-Growth studies

2.2.1. Model and Theory

Remittances have both welfare and growth effects. They directly alleviate poverty levels by increasing recipient families' incomes and living standards: Adams and Page (2005), Insights (2006), Siddiqui and Kemal (2006) and Gupta, Pattillo, and Wagh (2009). Given their effects on households' consumption, short-run effects on output are to be expected, but the real question is whether remittances have any long-term effects on economic performance, and whether remittances can hasten a country's economic development (Barajas et al, 2009). The idea, that remittances appear to be similar to FDI and other private international capital flows, and may therefore have similar effects on economic growth, seems

to be increasingly popular among policymakers and economists: Remittances could be "an important and stable source of external development finance" (Ratha, 2003). We looked at papers concerning the growth effects of remittances, and we noted an increase of more than 100 per cent in the quantity of empirical analysis since the beginning of the 2008 global crisis. We need to know if this optimism is truly warranted.

(1) Growth enhancing effects model

To estimate how remittances affect economic growth, models reflect various considerations. As noted above, remittances received can add to domestic consumption and savings. To the extent that remittances help families in the recipient country to maintain a minimum standard of living, remittances can raise the family members' productivity. However, remittances will be more likely to contribute to long-term growth, if the remittance receiving countries' political and economic policies and institutions use remittances to create the incentives for financial and business investment and saving. For example, a country's capacity to use remittances, and its effectiveness in doing so, might be influenced by local financial sector conditions (Giuliano and Ruiz-Arranz, 2009).

The traditional model for investigating the effect of remittances on economic growth is based on the extended version of the Solow model by Mankiw, Romer and Weil (1991)

$$\Delta \ln Y_{it} = \pi + \lambda \ln Y_{i0} + \gamma \ln REMIT_{it} + \beta_k [X_k] + v_i + \varepsilon_{it}$$

where the dependent variable is the average rate of growth and the control variables are:

- Proxy for macroeconomic management (openness to trade, inflation, Money M2, government expenditure, and so forth);
- Ratio of Investment to GDP;
- Proxy for development of financial sector (ratio of credit to GDP, deposits to GDP, loans to GDP);

- Human capital (population growth rate, years of schooling);
- Quality of institutions.

Authors agree on the choice of these control variables, although they do not always use the same ones.

(2) Channels and indirect effects

If Remittances can be expected to have large effects on economic growth, it is most important to examine the channels through which remittances receipts may exert such effects:

- Positively

(i) Reducing output volatility:

Remittances have been a remarkably stable source of income, relative to other private and public flows, and they seem to be compensatory in nature, rising when the home country's economy suffers a downturn. This combination of stability and counter-cyclicality has led some to believe that remittances play a stabilizing role at the aggregate level in recipient countries.

(ii) Through the financial sector:

The relationship between remittances, financial development, and growth is ambiguous. On the one hand, well-functioning financial markets, by lowering costs of conducting transactions, may help direct remittances to projects that yield the highest return and therefore enhance growth rates. On the other hand, remittances may become a substitute for inefficient or non-existent credit markets by helping local entrepreneurs to bypass a lack of collateral or high lending costs and start productive activities (Giuliano and Ruiz-Arranz, 2009).

(iii)Capital accumulation:

From a microeconomic perspective, if households face financial restrictions that constrain their investment activities, remittances inflows may ease such constraints, permitting an increase of physical and human capital accumulation. In fact, remittances inflows improve the creditworthiness of domestic investors, with a lower cost of capital in the domestic economy; indeed, they augment household collateral. Remittances receipts could also stimulate additional investment in the form of human capital accumulation. They could do so by financing the cost of this investment directly, or by reducing the need for younger members of the household to abandon formal schooling in order to work and contribute to household income. However, the effects on domestic economic growth depend on the recipients' subsequent participation in the domestic labor force. Positive growth effects obviously would not be forthcoming, for example, if the extra education funded by remittances made it possible for the recipients themselves to emigrate. (Barajas et al. 2009)

- Negatively

(iv) Appreciation of exchange rate:

Large and sustained remittances inflows could cause an appreciation of the real exchange rate and make the production of the tradable goods sector less profitable (the so called 'Dutch Disease' problem). Workers' remittances have the potential to inflict economic costs on the export sectors of receiving countries by reducing their international competitiveness (Amuedo-dorants and Pozo, 2004).

(v) Labor force :

Remittances could also indirectly affect labor supply by encouraging some remittance-recipient households to work less. This could reduce labor supply and reduce economic growth. Remittance transfers take place under conditions of asymmetric information, in which the remitter and recipient of the transfer are separated by long distances. This could lead to

significant moral hazard problems where the latter is likely to be reluctant to participate in the labor market, limiting their job search, and reducing labor effort (Chami et al, 2003).

(vi)Transmission of foreign shocks:

From a theoretical perspective, some observers have noted that the labor supply effects induced by altruistic remittances could cause the output effects associated with technology shocks to be magnified (Chami, Cosimano and Gapen, 2006). Empirically, while remittance flows may be more stable than other foreign exchange inflows, they are not insensitive to macroeconomic developments in the source countries, and thus represent a potential channel for the international transmission of business cycles; implying that greater "openness" to remittance flows, other things being equal, may not be stabilizing (Chami, Hakura and Montiel, 2010).

(vii) Bad incentives for government to do less

In a context of bad governance, remittances inflows strongly reduce public spending on education and health in receiving countries (Ebeke, 2012).

2.2.2. What explains the differences in the results?

Vote counting Table

	Direct	Indirect	Positive	Negative
All studies	83%	17%	59%	36%
Significant	65%	82%	74%	67%
Positive+significant	38%	73%		

This vote counting table presents the empirical results of the studies by sign and statistical significance. This is almost an extreme bounds analysis, but it is not a reliable way to

summarize the results of a literature in the presence of model polishing and asymmetry. However, it offers a first overview of what the literature has established.

These studies are different in their findings, but also, often in their analytical choices - related to the personal characteristics of the author (institutional affiliation), data (level of aggregation), the methodological choice or estimation technique (control of heterogeneity and endogeneity), which all contribute in their own way to the heterogeneity of the results.

Publication bias

Another important issue commonly explored in meta-analysis study is publication bias. The issue of publication bias implies a tendency for published papers to exhibit statistically significant results for the main variable of interest. Doucouliagos and Paldam (2012) identify two kinds of publication bias: polishing bias and censoring bias. A polishing bias occurs because most of us have a preference for clear results with high t-statistics. This preference is common but it may not necessarily influence the average result. A censoring bias occurs if referees and editors have widespread expectations about the size and sign of the effect of remittances on economic growth.

Since Doucouliagos and Paldam (2008), one interest of the meta-analysis approach is to bring into analysis non-sampling, or non-empirical questions, and quantify the influence of the interaction of researcher and his environment on the results. Publication bias has been found in most areas of Economics research (Doucouliagos and Stanley, 2008; Havranek and Irsova, 2011).Giventhe enthusiasm generatedbyremittancesin recent years, it seems important tonote the relevance of this phenomenon, even though it will probably be less important than in the aid effectiveness debate.

2.3. Empirical Strategy

2.3.1. Meta-analysis: Tools and Limits[1]

(1) Meta-Regression Analysis

The meta-regression model (known as MRA) has been developed to analyse the multi-dimensional nature of the research process. The impact of specification, data and methodological differences can be investigated by estimating an MRA of the following (linear) form:

$$\theta_i = \alpha + \gamma_1 X_{i1} + \cdots + \gamma_k X_{ik} + \delta_1 K_{i1} + \cdots + \delta_n K_{in} + u_i \quad (3)$$

where $\theta_i$is the standardised effect derived from the i^{th} study , $X_j$are dummy variables representing characteristics associated with the i^{th} study, $K_j$are continuous variables associated with the i^{th} study, γ and δ are the unknown regression coefficients, and $u_i$is the disturbance term, with usual Gaussian error properties. The regression coefficients in (3) quantify the impact of specification, data and methodological differences on reported study effects (γ_i). For example, because the size of datasets used by primary studies varies substantially, we control for the number of years and countries in the sample to find out whether smaller studies report systematically different outcomes. We include the average length (in years) of the data period to control for the different study periods chosen to capture the effects of remittances. The other moderator variables[2] of our MRA are related to publication details of the study (such as publication status, or year of publication), author's information (such origins or institutional affiliation), and estimation methods.

[1]Stanley (2005) provides a complete overview of meta-analysis tools.

[2]See Table 1 for details.

However, in Economics, the generally very limited number of available studies, which as a rule provide various 'competing' specifications, requires the meta-analyst to sample more than one observation per study. As these observations are derived from the same data, the lack of independence is obvious (Florax et al., 2002). To deal with this risk of potential bias we need to control for the differences in the quality of studies. So we propose a strategy to control for the "internal quality" of the model or framework used by authors in their meta-regression (probit model).

(2) *A proxy for better control of Heterogeneity among studies*

Internal Quality index (IQI)

We measure the sensitivity of the results to change and inclusion of the additional explanatory control variables. If including controls substantially attenuates the result of the coefficient, then it is possible that inclusion of more controls would reduce the estimated effect even further, and vice versa. If, on the other hand, the inclusion of controls has no effect on the magnitude of the coefficient's result, then we can be more confident in suggesting a causal interpretation for the relationship. We formalise this intuition[3] and derive the ratio of the internal quality of the paper:

Consider first a Mankiw, Romer and Weil (1992) growth model (which we call "restricted model" denote by R), where X are countries' characteristics and T workers' remittances

$Y = \alpha T + X'\gamma + \varepsilon$;

The OLS estimation of the effect of remittances on growth, has a standard omitted variables bias (Wooldridge, 2002):

[3]Altonji et al. (2005) use a similar relationship to address selection on unobservables in estimating the effect of the treatment.

$$P\lim\hat{\alpha}_{ols,R} = \alpha_0 + \quad \gamma\frac{\text{cov}(T, x'\gamma)}{\text{var}(T)}. \qquad \text{"}\textit{Restricted model}\text{"}$$

Now, suppose we add additional individual controls, not observable by the researcher during the identification process, but that could potentially influence the impact of remittances: $X = x + \tilde{X}$ (where x are observed). The new OLS estimate of α will have the following bias:

$$P\lim\hat{\alpha}_{ols,extend} = \alpha_0 + \quad \gamma\frac{\text{cov}(T, \tilde{X})}{\text{var}(T)}, \qquad \text{"}\textit{Extended model}\text{"}.$$

The intuition of the authors of Altonji et al. (2005), is that the ratio between the estimates in restricted and extended models,

$\hat{\alpha}_{ols,extend} \Big/ (\hat{\alpha}_{ols,R} - \hat{\alpha}_{ols,extend}) = \frac{\text{cov}(T, \tilde{X})}{\text{cov}(T, X'\gamma)}$ measures how much stronger the selection on unobservables needs to be, relative to observables, to explain the entire effect. A large ratio suggests a strong internal quality of the results for the growth enhancing impact of remittances.

2.3.2. The Data for the MRA

(1) Literature Sampling and Combining Estimates

We utilised the following sampling criteria. First, we searched the EconLit, sciencedirect, and other databases for empirical studies on remittances and growth. Subsequently, we reduced the sample by considering only articles with comparable estimates. The total number of studies left after applying these criteria was 21.

For each reported regression in the primary studies, we recorded an estimate of the effect of remittances on growth and its associated standard error. In addition, we recorded author and publication details, characteristics of the original data set (such as use of sub-sample, numbers of countries, etc), the level of aggregation (countries or regions), initial year of the sample and

the number of observations, and regression characteristics such as the type of estimator, and the type and number of conditioning variables included in the regression. The total number of observations in our study is 66, each corresponding to a regression, provided by 21 primary studies. An overview of the studies is given in the appendix.

The data used in this paper originate from 21 published and unpublished Remittances-Growth studies covering the period 2004 to 2011 (see appendix). Since each of the 21 studies reports one or more regressions, we have 66 observations to work with.

We have two binary dependent variables: the first taking the value of 1 if the study reports a statistically significant remittances/growth effect, and otherwise 0. The second taking the value of 1 if the study reports a positive effect of remittances on growth and otherwise 0. The aim of our probit-MRA[4] is to identify the characteristics of studies that influence the reported results. The number of observations is limited, so we only use the most important explanatory variables, which are defined in Table 1.

[Here Table 1]

(2) Differences in characteristics of studies

We are interested in exploring whether the authors' institutional affiliation affects the results concerning the growth enhancing effect of remittances. We include the IMF and World Bank dummies in order to explore the effect of institutional affiliation. We add a control variable related to the native country of authors to see if their potential participation in remittances transactions, has any influence on the view they take of remittances (that is "actor" is our binary measure of influence of origin).

[4] DP10 use a probit MRA for a meta-analysis of aid effectiveness studies, we use their notations in the text.

Five variables are included to capture the impact of data and specification differences: *NrCountrie*s, *NrYears*, *Year average*, *NrControls*, and *Channels*. For Doucouliagos and Paldam (2008), if the effect related to our dependent variable is robust, we should expect a positive correlation between the number of countries included in a study and the study results. Similarly, we include the number of years covered by each study. Mekasha and Tarp (2011) criticise this view because it supposes effect homogeneity across studies. In contrast, the impact of remittances on growth across the 21 studies is heterogeneous, as well as across countries and over years.

NrYears and *Year Average* control for different lengths of period of study data to analyse remittances. *NrControls* and *Channels* represent the number of controls and transmission channels included in a study in order to reduce reverse causality and capture the effective impact of remittances. These variables are related to the perception and methodological choice authors have about remittances. *Direct* is our binary measure of methodological choice: Remittances have a direct effect or an indirect effect.

Three variables are related to estimation techniques: *Endogeneity*, *Panel* and *Fixedeffects* are included to control for difference in treatment of endogeneity and heterogeneity in the Remittances-Growth model.

Finally, we have our internal quality index to account for quality differences between studies and capture the true empirical effect.

2.4. Results of the Multivariate Meta-Regression

We use meta-regression analysis (MRA) to explain heterogeneity in results and determine the true effect of remittances on growth, while controlling for differences in studies' designs.

[Here Table 2 and Table 3]

Table 2 presents probit MRA results and Table 3 presents MRA results corrected for differences in design of studies, using our internal quality index as a proxy of the quality/stability of the study. In the specifications reported in columns 1 to 5 the dependent variable of the probit MRA is the "significant estimate effect" dummy[5]. The specifications in columns 6 to 11 use the "positive estimate effect" dummy as the dependent variable of our probit MRA.

The results in table 2 show that authors' institutional affiliation, the level of data aggregation, and the methodological choice to capture Remittances/Growth effect are relevant for the findings. As concerns the authors' characteristics, both WB and IMF dummies are significant in the probit-MRA. We find that World Bank affiliated studies are more likely to report a significant effect of remittances, whereas IMF studies have a reduced probability of finding a positive growth effect of remittances. The surprising result is due to the variable related to native countries of authors. In the probit-MRA of the positive effect of remittances, it appears that our measure of influence of origin has a negative and significant effect. Suggesting that authors who are potential actors in remittances transactions, because of their country of origin, are likely to report a negative effect of remittances.

Furthermore, we have noticed that the length of the period studied, the inclusion or omission of some standard control variables, the transmission channels, and the treatment of

[5]section 2.3 explains data.

endogeneity of remittances flows in growth model are of importance. When we account for differences in study design[6] (IQI) as in Table 3, our findings remain the same.

These MRA results are related to some common issues in the empirical assessment of the impact of flows on growth:

(i) **Length of period studied**:

We find that the longer the period studied, the less is the probability of finding a significant effect of remittances on growth. In column 7 and 11 of table 2, the dummy variable "Yearaverage" is positive and significant, suggesting that studies using longer time periods better measure the positive effect of remittances on growth, which is in line with the Roodman (2007) comment about the Aid/Growth model.

In fact, on the contrary to key cross-section studies in the growth literature that use periods of 10 to 25 years despite the small samples that result (Barro 1991; Mankiw, Romer, and Weil 1992; Sachs and Warner 1995), remittances/growth studies generally consider a time span of around 5 or 10 years and claim that their specifications are based on one of the endogenous growth models. However, it is hard to understand how their specifications are derived from the claimed endogenous growth model. Commenting on the unsatisfactory nature of specifications in many such empirical works, Easterly, Levine and Roodman (2004) have noted that "this literature has the usual limitations of choosing a specification without clear guidance from theory, which often means there are more plausible specifications than there are data points in the sample".

The consequence is that to the extent that 5 years does not adequately proxy for long-run growth, the panel methods may be less precise in assessing the remittances/growth relationship than methods based on longer time period data (Demirgüç-Kunt and Levine, 2008).

[6] In the past Meta-studies used to take publication status as proxy of differences in study design, even if the eventuality of publication bias makes this procedure less relevant.

(ii) **Transmission channels**:

The coefficient for the variable capturing the methodological choice between the direct and indirect effect of remittances, is negative and significant in both probit-MRAs. Studies that look for a direct effect of remittances have a low probability of finding a significant growth enhancing impact of remittances. We conclude, through this finding, that remittances work mainly by indirect effects. Furthermore, as explained by Gomanee and Morrisey (2005) concerning aid effectiveness, other than including remittances flows as an explanatory variable in the growth regression, empirical studies should attempt to specify and test the mechanism by which remittances affect growth. Specifying these mechanisms would also help to deal in some way with reverse causality. Probit-MRA results suggest that the more we take into account the transmission channels, the better are the estimates of the impact of remittances on growth (columns 7 and 10 in Table 2, columns 6,9,10 in Table 3).

(iii)**Simultaneity and Endogeneity**:

In the growth equation, remittances are likely to be correlated with the error terms because remittances are affected by income, and possibly by growth, according to the determinant equations (Singh et al., 2011). Since the late 1990s, instrumental variables and GMM methods have proliferated as a prominent feature for adequately dealing in the growth regression with the endogenous response of capital flows to economic growth. However, the treatment of the endogeneity of foreign capital flows in the growth model has not yet been solved in a satisfactory way and remains an important issue.

The weaknesses of macroeconomic instruments suggest that promising candidates for instruments could be found among microeconomic determinants of remittances, since these are unlikely to exert a direct impact on the growth rate of the recipient countries. Barajas et al (2009) discussed this strategy for dealing with the endogeneity problem of remittances flows

based on microeconomic instruments**.** Unfortunately, direct observations of such variables, for example the transaction cost associated with a remittance transfer[7], are unavailable.

True empirical evidence and best study design

The results of the multivariate meta-regression can be used to assess the true empirical effect of remittances. This approach is based on the "quality" of studies. The idea is that we can determine the true empirical evidence on the Remittances/Growth relation, following the results provided on average by the "best" studies. However, defining "best studies" could be subjective because different researchers may prefer different methodologies (Havranek and Irsova, 2011). To deal with this issue, our definition of quality is related to the stability of estimates within the framework chosen in the study as explained in section 2.2; the MRA variables already control for differences between studies.

The coefficient for the variable capturing differences in studies' designs is positive and significant for all specifications in Table 3, suggesting that "best" studies conclude that there is a positive and significant growth enhancing effect of remittances. We extend this conclusion, using the above MRA results, to synthesise the empirical evidence about the Remittances/Growth relation: *Remittances have significant indirect and positive effects on growth.*

[7]Barajas et al. (2009) explain that changes in the effective cost of remittances flows should be negatively correlated with aggregate remittances flows, but the microeconomic innovations affecting such transactions costs should be uncorrelated with the error terms in the growth equations for remittance-receiving countries.

2.5.Conclusion

The aim of this paper is to answer to two questions: why results vary across Remittance/Growth studies, and what the true empirical effect of remittances on growth is. With a meta-analysis of results collected from 21 studies, we find robust evidence that remittances have positive indirect effects on growth. This conclusion suggests two implications, in terms of policy and empirical research. Given the fact that only indirect effects are significant, contrary to what is expected by some development economists who believe that remittances are similar to foreign direct investment and private capital inflows in their effects on growth, governments should focus on policies that can be used to enhance the incidence of channels on the long run growth rate, instead of depending only on an increase in remittances receipts. Therefore, studies in this literature should focus on channels and mechanisms by which remittances affect growth. We also established that the length of period studied and the treatment of endogeneity influence the findings about the impact of remittances.

Another feature of meta-analysis is that we can test the genuineness of empirical evidence. Indeed, it allows usto integratein the analysisnon-empirical factors related tothe research environment. As wehave seen, author's institutional affiliation (World Bank or IMF) influences the results, but nevertheless there is evidence of a clear empirical effect that goes beyond publication bias. As show in Table 3 by the *internal quality index*, "best" studies have high probability of reporting a positive and significant effect of remittances on growth.

Tables and Figures:

Table 1: Moderator variables of MRA

Variable	Description
Positive	BD if study reports significantly positive effect θ
DevJour	BD if published in development journal
Direct	BD if study focuses on direct effect of remittances
Actor	BD if author(s) related to remittances transactions
WorldBk	BD if author(s) affiliated to World Bank group
IMF	BD if author(s) affiliated to IMF
NrCountries	Number of countries included in the sample
WorPap	BD if the research has yet to be published in journal
NrYears	Number of years covered in the analysis
Endo	BD if remittances was treated as an endogenous variable
Region	BD if paper controlled for regional effects
Subsample	BD if estimate relates to sub-sample of countries
Reproduce	BD if estimate is an attempt to replicate results
Fixedeffects	BD if Fixed Effects estimator used
Finmarkets	BD if controlled for financial markets development
Institutional factor	BD if controlled for quality of institutions
Aid	BD if included aid term
Instability	BD if paper controlled for political instability
Transmission Channels	Number of transmission channels controlled in the analysis
Yearaverage	Length of period in years average

BD= binary dummy. It is 1 if condition fulfilled, otherwise 0.

Table 2: Meta-probit regression analysis

Moderator MRA	Significant effect (dummy)					Positive effect (dummy)					
	1	2	3	4	5	6	7	8	9	10	11
Author characteristics											
WB	0.79 (1.08)				**2.01 (1.88)**	-0.45 (-0.55)					
IMF	0.29 (0.48)					**-1.93 (-2.44)**				-0.87 (-1.40)	**-1.75 (-2.42)**
Actor in remittances	0.29 (0.48)				0.83 (0.94)	-0.95 (-1.25)					**-2.50 (-2.59)**
Data characteristics											
NrCountries		0.0006 (0.11)			0.009 (0.73)		-0.004 (-0.80)			-0.0008 (-0.09)	-0.02 (-1.45)
NrYears		**-0.054 (-2.29)**			**-0.055 (-2.05)**		-0.001 (-0.07)			-0.024 (-0.69)	-0.17 (-0.54)
Year average		-0.025 (-0.35)			-0.053 (-0.40)		**0.15 (2.02)**			0.085 (0.81)	**0.22 (1.99)**
NrControls		0.13 (1.45)			0.15 (1.42)		0.13 (1.41)			**0.21 (1.85)**	0.13 (1.17)
Channels		0.01 (0.06)			-0.44 (-1.40)		**0.46 (2.56)**			**0.33 (1.60)**	0.22 (0.90)
Estimations characteristics											
Fixed effects			0.45 (1.18)		0.35 (0.74)			0.33 (0.91)		0.73 (1.44)	0.47 (0.86)
Panel			0.43 (1.08)		0.72 (1.17)			0.13 (0.34)		-0.14 (-0.24)	1.12 (1.26)
Endogeneity			0.27 (0.67)		-0.25 (-0.41)			**1.09 (2.52)**		0.72 (1.15)	0.71 (1.07)
Methodological choices											
Direct				-0.53 (-1.04)	**-1.27 (-1.79)**				**-1.33 (-2.96)**	-0.95 (-1.34)	**-1.34 (-1.61)**
Institutional factor				**0.81 (2.02)**	0.24 (0.47)				0.34 (0.97)	0.31 (0.63)	0.22 (0.41)
Published											
constant	0.09 (0.16)	**1.77 (2.12)**	-0.09 (-0.23)	0.55 (1.00)	1.02 (0.64)	**1.45 (1.87)**	-0.51 (-0.64)	-0.26 (-0.64)	**1.28 (2.41)**	0.20 (0.16)	2.85 (1.59)
Pseudo R2	0.018	0.098	0.029	0.080	0.267	0.161	0.243	0.083	0.0836	0.374	0.466
Prob (chi2)	0.684	0.149	0.491	0.083	0.054	0.002	0.000	0.059	0.023	0.000	0.000

Note: The estimation method is random-effect meta-regression using residual maximum likelihood to estimate between study variance, with clusters and small sample correction. z-statistics are in parentheses, using robust and clustered standard errors. Numbers in bold are statistically significant, at least at the 10% level.

Table 3:Meta-probit regression analysis (with explicit control for Quality of studies)

Moderator MRA	Significant effect				Positive effect					
	1	2	3	4	5	6	7	8	9	10
Author characteristics										
WB	0.49 (0.58)									
IMF	0.28 (0.38)				**--1.56 (-2.76)**				**-1.01 (-1.96)**	**-1.26 (-2.07)**
Actor in remittances	0.19 (0.27)				-0.61 (-1.19)				**-2.20 (-3.58)**	**-2.93 (-3.40)**
Data characteristics										
NrCountries		0.005 (0.08)				0.004 (0.46)			-0.004 (-0.42)	-0.005 (-0.47)
NrYears		-0.036 (-1.38)				0.02 (0.87)			0.02 (0.88)	0.04 (1.51)
Year average		0.036 (0.44)				**0.34 (3.64)**			**0.50 (3.17)**	**0.67 (3.63)**
NrControls		0.10 (1.13)				0.10 (1.49)			0.16 (1.53)	0.11 (0.96)
Channels		0.027 (0.15)				**0.66 (2.72)**			**0.64 (2.00)**	**0.75 (2.22)**
Estimations characteristics										
Fixed effects			0.45 (1.10)				0.29 (0.71)		0.66 (0.87)	0.28 (0.40)
Panel			0.43 (1.02)				0.11 (0.22)		-0.35 (-0.30)	-0.50 (-0.36)
Endogeneity			0.50 (1.15)				**1.25 (2.97)**		**1.58 (3.69)**	**2.02 (3.06)**
Methodological choices										
Direct				**-0.79 (-1.67)**				**-1.40 (-2.35)**		
Institutional factor				0.65 (1.57)				0.22 (0.35)		**1.56 (2.29)**
Quality	**0.89 (2.44)**	**0.82 (1.66)**	**1.01 (2.69)**	**0.91 (2.47)**	0.30 (0.52)	**2.10 (1.98)**	0.60 (1.09)	0.50 (0.84)	**2.78 (2.65)**	**3.69 (3.82)**
Published										
constant	-0.11 (-0.16)	0.53 (0.47)	-0.51 (-1.11)	0.65 (1.43)	**0.98 (1.84)**	**-3.44 (-1.91)**	-0.51 (-0.90)	**1.20 (2.23)**	-2.27 (-1.48)	**-3.30 (-2.06)**
Pseudo R2	0.094	0.133	0.124	0.148	0.166	0.398	0.118	0.108	0.550	0.580
Prob (chi2)	0.099	0.087	0.036	0.008	0.018	0.000	0.036	0.11	0.000	0.000

Note: The estimation method is random-effect meta-regression using residual maximum likelihood to estimate between study variance, with clusters and small sample correction. z-statistics are in parentheses, using robust and clustered standard errors. Numbers in bold are statistically significant, at least at the 10% level.

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PART 2. THE INCREASING INFLUENCE OF EMERGING DONORS IN AID ALLOCATION

Chapter 3. Emerging Donors Aid Allocation and Recipient Fiscal Behavior

Abstract:

From the perspective of recipients, the presence of emerging donors in the aid market leads to the problem of higher transaction costs in the aid allocation process, with more aid fragmentation and additional fiscal management challenges for governments. This paper investigates how emerging donors' aid allocation influences the fiscal behavior of recipients. Our findings suggest that countries receiving aid from emerging donors enhance their fiscal response to aid, in particular through an increase in their aid absorption rate.

Keywords: *Emerging donors, Aid allocation, Fiscal policy, Absorption rate, Spending rate, Aid fragmentation, Transaction costs, Recipients*

3.1. Introduction

The increasing influence of emerging donors in aid architecture has been at the center of recent academic and policy debates (Manning, 2006; Naim, 2007). In the face of the increase in aid from these new donors, traditional donors, members of Development Assistance Committee[1] (DAC), have become more anxious and vociferous about the impact of these emerging donors on the pattern of aid provision; arguing that emerging donors are encouraging poor policies, lowering standards and increasing the debt burden of recipient countries. Traditional donors are worried about the impact of the emerging donors on governance standards and public management systems in low-income countries (LICs). Some traditional donors fear that countries with weak rule-of-law, particularly those with abundant natural resources, have gained greater freedom to circumvent the demanded policy and institutional reforms. Manning (2006) discusses the possible risk that loans from emerging donors to LICs may prejudice their debt situation and may waste resources on unproductive investments.

China is at the forefront of this new anxiety. However, Woods (2008) argued that the empirical evidence shows higher growth rates, better terms of trade, increased exports and higher public revenues for some African countries as a result of cooperation with China. Nevertheless, if the increasing influence of non-DAC donors[2] creates new donor competition, which may enlarge the recipients' room for manoeuvre, the presence of emerging donors aiding Africa and other LICs is by no means a guarantee of enhanced development. Indeed, emerging donors not only provide aid in order to facilitate economic and social development;

[1] The 24 members of the Development Assistance Committee (DAC) are : Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA and European Union Institutions (OECD, 2011)

[2] We will use the term "non-DAC donors" to describe emerging donors, even if it defines the group by what they are not, rather than by what they are.

they give aid also for commercial interest and to gain political influence (Kragelund, 2008; Dreher et al, 2011).

Moreover, an observation of the highly fragmented aid market may lead to the conclusion that the arrival of emerging donors exacerbates the situation and thus undermines macroeconomic management in recipients, because of the heavy transactions costs associated with donor-recipient coordination. Also, given that most aid goes through the public sector, its impact on the recipient economy will depend on how it affects governments' fiscal behavior (Morrisey, 2012; Ouattara, 2006). Therefore, the presence of non-DAC donors leads to the problem of higher transaction costs in aid allocation processes, with more aid fragmentation and also creates additional fiscal management challenges for the recipient governments.

This paper has for its starting point the two previously mentioned issues for a recipient country related to emerging donor aid allocation:- New fiscal management challenges and Aid fragmentation. We will analyze how these concerns are managed by LICs. The purpose of this analysis is twofold. Firstly, we use fiscal response modeling to describe how emerging donors affect the fiscal behavior of recipient governments. Secondly, we develop a theoretical framework to explain how welcoming emerging donors could be used by recipient governments as a strategic attitude to modify their fiscal response to aid flows. Our findings indicate no strong evidence that non-DAC donor aid undermines recipients' fiscal behavior, and contrary to the usual preconceptions, the presence of emerging donors in aid market seems to increase the rate of aid absorption.

The structure of this paper is as follows: Section 2 presents some stylized facts about emerging donors' aid. Section 3 reviews the literature and modeling issues related to aid and fiscal behavior. Section 4 details the empirical methodology and interprets the results of fiscal response models. Section 5 presents, with reference to an absorption-spending framework,

how recipients can take advantage of the presence of emerging donors to improve their response to aid flows. Section 6 offers conclusions.

3.2. Emerging donors and Recipients: Some Stylized facts

3.2.1 Who are Emerging donors and how they proceed?

According to Paulo and Reisen (2010), more than 30 donor countries operate outside the DAC, a 50 year old club of 'established donors[3]'. We choose the term "non-DAC donors" to describe these actors, even if it defines the group by what they are not, rather than by what they are[4].

The most important non-DAC donors included China, India, Brazil, Venezuela, Mexico, Russia, United Arab Emirates, Saudi Arabia, South Africa, Kuwait, Thailand and Korea. To that list, we can add the group of newest member states[5] of the EU that are working to align their programmes with EU principles and commitments (Zimmerman and Smith, 2011).

Most of these new donors are in a quest for energy security, enlarged trading opportunities and new economic partnerships. Therefore, although there may not be policy conditionalities, the majority of aid from emerging countries, especially China, India, and Venezuela, is combined with special trade arrangements and commercial investments. Statistics show that is not uncommon; many traditional donors also give tied aid, despite an official policy of

[3] The 24 members of the Development Assistance Committee (DAC) include the following: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA and European Union Institutions (OECD, 2011)

[4] Zimmermann and Smith (2011) introduce well these emerging donors.

[5] Bulgaria, the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovenia and the Slovak Republic.

untying. For example, 64 percent of SouthKorea's aid is tied, 45 percent of Greece's aid, and 23 percent of the United States' aid is tied (Walz and Ramachandran, 2011).

The most obvious critique of emerging donors focuses on their support for rogue states, or, as they would put it, their determination not to involve themselves in the politics of countries with which they deal. Another aspect of their non-interference policy, emerging donors traditionally do not apply conditionality on their aid, while traditional donors are known for requiring specific changes to governance and macroeconomic policies in recipient countries. Non-DAC donors generally have fewer requirements to meet. This enables more rapid disbursement compared to an often-prolonged DAC process. (Walz and Ramachandran, 2011)

Given an alternative source of aid, poor countries choose to work less with those who 'burden' aid or loans with strong reforms requirements, and so reducing the influence of the DAC donors and international organizations. Thus, the emerging donors are said to be weakening progress made by the traditional donors.

3.2.2. Potential effects of emerging donors aid: Preliminary analysis

The overall arguments can be resumed in the fear that a new consensus will replace the long-hallowed Washington consensus on economic policy. But the common thread against emerging donors do not have evidence that macroeconomic disaster has in fact followed acceptance of aid from emerging donors. Therefore, this paper tries to present fiscal management challenges faced by countries where non-DAC donors are becoming more powerful. Figure 1 shows the evolution of some fiscal behaviour's variables in recipients when emerging donors influence in ODA increases. It seems that there is a positive correlation between short-term debt and the presence of non-DAC donors. Furthermore, tax effort and public investment are negatively correlated to aid flows from emerging donors.

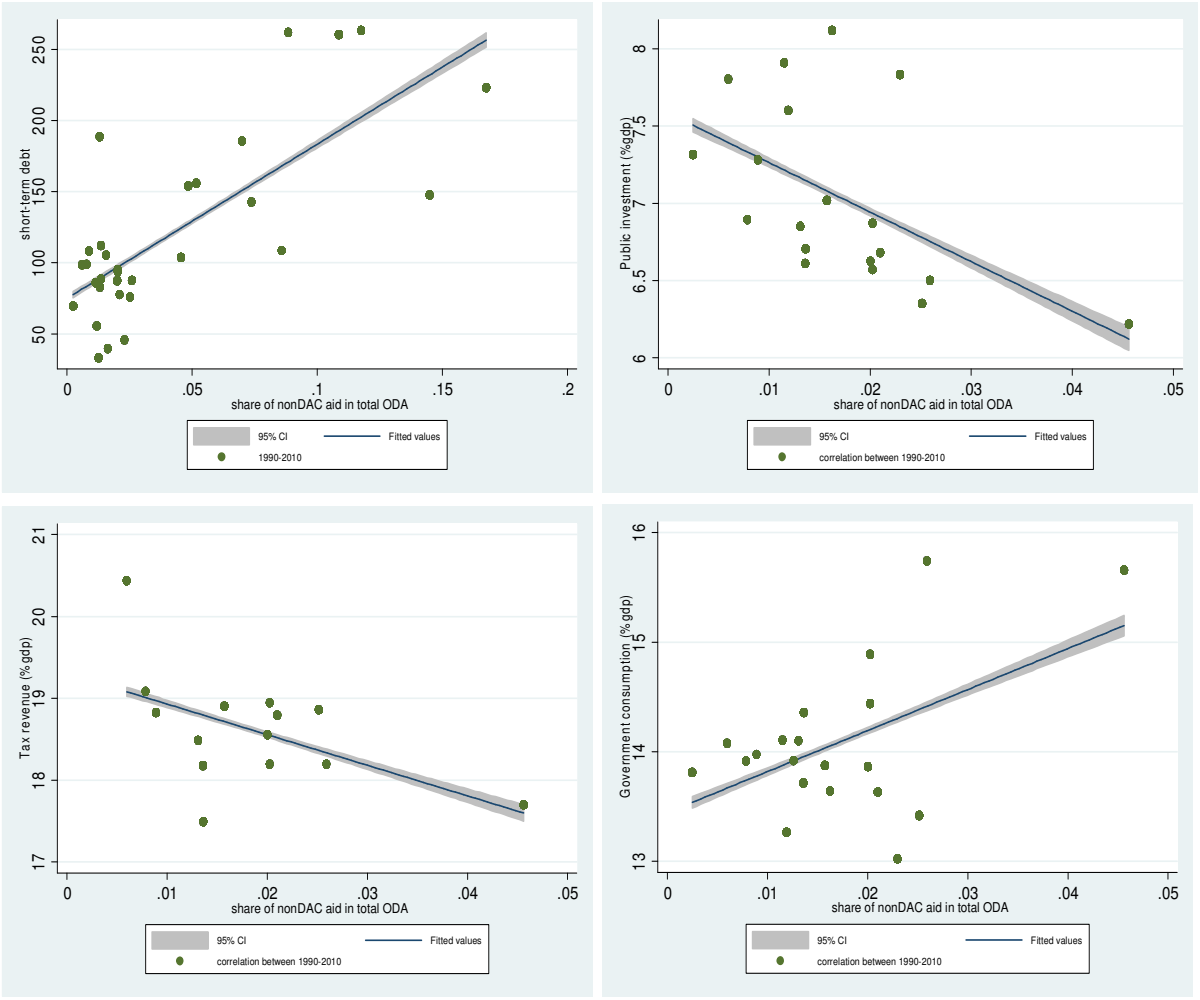

Figure1: Correlation Graphs: Emerging donors influence in ODA and Evolution of fiscal behaviour in recipients
Source: Author's calculation

These observations suggest that the presence of non-DAC donors induce different recipients' fiscal behavior from those expected and described by Ouattara (2006). In fact using panel data over the period 1980–2000, he found that public investment is positively related to aid flows; aid flows exert a positive impact on government developmental expenditure and a negative significant impact on non-developmental expenditure; aid does not discourage revenue collection effort. His results also suggested substitution between borrowing and aid. The figure shows that governments receiving more non-DAC aid follow some potentially dangerous fiscal behaviors, comforting the critique made about emerging donors aid allocation. However, we need a more robust analysis to show whether or not a

macroeconomic disaster has followed acceptance of aid from emerging donors in recipients countries. This paper aims to fill this gap.

3.2. Methodological and empirical reviews

Given the highly fragmented "aid market" in some LICs, the emergence of new donors might undermine the situation and lead to increasing challenges in macroeconomic management by LICs. We need to understand why LICs' governments accept aid from emerging donors despite the associated transaction costs. Of course, the main reason is that developing countries have begun to look beyond the traditional donors for policy ideas, this change has been caused by their dissatisfaction at the ineffectiveness of aid as regards their development needs. Welcoming aid from emerging donors could be a passive willingness to "accept whatever aid is offered", or part of a carefully considered strategy that views the new donors as providing alternatives important to a country's balanced development (Sato et al, 2011).

Most of the aid that is spent in a country goes to or through the government, or finances services that would otherwise be a demand on the budget. Our analysis focuses on the influence of emerging donors' aid allocations on the recipient government's fiscal behavior, in terms of the decisions between various sources of revenue (e.g. taxation and domestic borrowing), and areas of expenditure (e.g. public investment and recurrent government expenditure).

3.2.1. Brief review of related literature

We will consider fiscal effects and aid fragmentation.

Aid may affect government spending, the level of tax revenue and borrowing behavior. Morrissey (2012) provides a good survey of fiscal effects studies, and finds that there is relatively little evidence about the effect of aid on the level and evolution of government spending. One reason is that data is not available for long periods. Secondly,studies which examine the fiscal effects of aid focus on fungibility, but the fungibility approach, does not explain how aid impacts on recipient government fiscal behavior.

Our analysis ties the fiscal effects to the aid fragmentation issue related to the emergence of new donors. There is evidence that donor fragmentation has negative consequences, both for the effectiveness of aid, because of higher transactions costs (Djankov et al,2009), and for the domestic institutions in recipient countries (Knack and Rahman, 2007). The study of donor fragmentation has received a lot of attention recently. From the perspective of policy makers, the question of aid fragmentation has direct implications for the way aid programs are administered. Donors are concerned about how their aid is used, especially how it affects fiscal behavior by recipient governments. With increasing number of donors administrative requirements tend to overburdening local authorities (Easterly, 2007).

The focus on transactions costs causes studies to skip the discussion on the potential strategic behavior behind the welcoming of new donors. Indeed, highly concentrated donor structures mean that unexpected aid shortfalls by one main donor can do serious harm to overall aid flows to a recipient country. Aid fragmentation could serve to reduce the risk of a severe reduction in aid flows.

(1) Modeling fiscal behavior

To investigate fiscal behavior, studies use fiscal response models.

Fiscal response models view governments as organisms that attempt to optimize the value of some ultimate target such as the rate of economic growth. In reality, governments do this by steering certain intermediate policy variables towards their desired levels (Cassimon and Van Campenhout, 2007).

Fiscal response models have been criticized on a number of grounds. The need to presume the existence of, and estimate, targets for government expenditure and revenue seems to be a weak point. The sensitivity of this method to starting values leads to cicumvention of this problem by estimating fiscal response models in a vector autoregression (VAR) framework.

Ouattara (2006) provides a comprehensive analysis of the fiscal effects of aid with panel data methods:

It is assumed that decision-makers in the public sector behave as a single individual having an effective homothetic preference map and with the following utility function:

$$U = f(I_g, G, R, A, B)$$

where Ig stands for public investment, G for government consumption, R for government revenue (tax and non-tax), A for net foreign aid disbursements, and B for the flow of public borrowing from other sources (domestic and foreign).

It is then assumed that the public authorities minimize the following quadratic loss function:

$$U = \alpha_0 - \frac{\alpha_1}{2}\left(I_g - I_g^*\right)^2 - \frac{\alpha_2}{2}\left(G - G^*\right)^2 - \frac{\alpha_3}{2}\left(R - R^*\right)^2 - \frac{\alpha_4}{2}\left(B - B^*\right)^2$$

subject to the budget constraint $I_g + G = R + A + B$; where the starred variables indicate exogenously determined targets, and $\alpha_i > 0$, i =1,. . .4 represent the weight attached to each element of the utility function. The problem has been to obtain the target variables included in the model[6]. In this paper classic panel data econometrics have been adopted.

3.3. Emerging Donor Impact on Recipient Fiscal Behavior

3.3.1.Methodology and data issues

(1) The model

The central insights from our paper associate the evolution of aid architecture and the reaction functions that frame recipients' fiscal policy choices. Therefore, a fiscal policy reaction

[6] Various estimation methods were used to estimate these target variables. See Ouattara (2006) and Morrissey (2012) for details.

function where a measure of the fiscal behavior reacts to the emerging donors variable is a possible avenue for such analysis:

$$Y_{it} = a_i + \beta X_{it} + \gamma Z_{it} + \eta_i + e_{it}$$

Our dependent variables are standard in the fiscal response literature. The first variable in the system is current account balance. Secondly, we disaggregate government expenditure into current expenditure and public investment. The two other variables in our system are the level of domestic borrowing, and tax revenue. We estimate our model for each policy variable.

Our key independent variables are emerging donors share in total aid[7], and donor fragmentation. The purpose is to separate the effect of increasing donor fragmentation from the changes related to non-DAC aid allocation. We follow Kimura et al (2012) and calculate the Herfindhal-Hirschman index (HHI) of aid shares. The HHI is calculated by taking the sum of squared aid shares of all donors:

$$HHI = \sum_{i=1}^{N} s_i^2,$$

where donor i's aid share in total aid received is defined as $s_i \equiv {aid_i}/{total.aid}$. The donor fragmentation variable is obtained by subtracting the HHI from 1.

Because aid flows are tied with commercial transactions, an indicator of average trade intensity with emerging donors is included. To estimate the influence of the bilateral trade, we use the International Monetary Fund's Direction of Trade Statistics (DOTS). The other variables include lagged dependent variables, level of economic development, foreign direct

[7]Because of China's high-profile in Africa, much of the discussion about new donors has centred on China's role as a new actor in development cooperation, and the differences between its approach to development cooperation and the DAC principles. We use the ratio between China and US GDP as proxy for the perception of the influence of emerging countries in the global economy. We make the instrumentation of the emerging donor share in total ODA using the ratio of China and US GDP.

investment, exports, imports, domestic output growth rate, terms of trade, financial openness, savings ratio, government size, and institutional variables.

We employed panel data regression methods to evaluate our model. We start by using a dynamic panel data specification, and apply the Blundell-Bond 'system-GMM' estimator. The main advantages of these GMM estimators relate to their perceived robustness to heteroscedasticity and non-normality of the disturbances. Moreover, the use of instrumental variables helps address bias arising from reverse causality (Martins, 2011). Despite the popularity of dynamic panel data methods in applied research, to take into account potential cross sectional dependence and the presence of cointegrating non-stationary variables, we also use Mean Group estimators (Pesaran et al 1999).

(2) data

The data used in this article was mainly collected from the IMF's World Economic Outlook (WEO) and the World Bank's World Development Indicators (WDI). Our data cover 82 developing countries over the period 1980–2010. The size of the samples varies due to data availability with respect to our dependent variable. See Appendix for more details.

3.3.2. Empirical results

We start by investigating the relationship between emerging donor aid and the current account balance of recipients (Table 1). The current account deficit has to increase by the same amount as aid to effect a complete transfer of resources (Buffie et al, 2010). In the system-GMM, the estimated coefficients of explanatory variables usually represent short-term impacts. The results suggest that an increase of non-DAC influence in aid allocation leads to

an increase of current account deficit. It seems that non-DAC aid increases the real transfer of resources to recipient governments, either directly via imports or indirectly via increased public expenditure. The second column shows the Pesaran's estimator, and gives the average long-run fiscal response of recipient governments to increased emerging donor aid. These estimates confirm our previous findings.

We now turn to the second empirical question about borrowing behavior (Table 2). The results show that our variable of interest (non-DAC influence in aid allocation) has a negative and statistically significant sign, suggesting that non-DAC aid allocation is generally associated with a change in government borrowing behavior. This finding recalls the fear of debt unsustainability in countries welcoming emerging donor aid expressed by Manning (2006), Moses (2007), and others. However, at this level we do not have evidence that this increase in borrowing level is sufficient to undermine debt sustainability in recipient countries.

Turning to the tax revenue equations (Table 3), we find no strong evidence that non-DAC aid undermines government tax revenue. On the contrary it seems that the presence of emerging donors leads to an improvement of recipient government fiscal effort. In fact, to evaluate fiscal effort, we disaggregate taxation between fiscal potential and real fiscal effort as explained in Brun et al (2009)[8]. No significant effect is evident in the structural taxation equation, while the "revealed" fiscal effort equation shows a positive short-run effect. (We are aware that data availability is a problem here).

In Table 4, we find no evidence concerning the effect of non-DAC aid on public investment.

When we combine our non-DAC aid variable findings with our second variable of interest "aid fragmentation", we see that aid fragmentation has a different impact. It leads to an

[8] We build an indicator of the “revealed” policy by computing the difference between the observed flows and the “structural” flows that result from the non-political or structural determinants of these flows. These “structural” flows are the fitted values derived from a regression of observed flows on economic determinants. The residuals of this regression, the flows that remain unexplained by the regression, represent the impact of the policy and can then be used to build an indicator of this policy.

increase in non-DAC aid. This helps to explain why predictions about the impact of emerging donors on fiscal behavior, based on the increased transaction costs and lower standards hypotheses, are not confirmed by empirical results.

The thinking behind the results

To interpret what seem to be counter-intuitive findings we consider the Hudson and Mosley (2008) framework on aid volatility and donor concentration. They note that donor concentration should serve to reduce aid volatility, as follows:

Let A be the total aid provided by two donors (x and y). The combined volatility of aid is given by $Var(A) = \sigma_{xx} + \sigma_{yy} + 2\sigma_{xy}$.

Now consider that the same amount is provided by a single donor, but divided into two parts of equal size; then by definition $Var(A) = \sigma_{xx} + \sigma_{xx} + 2\sigma_{xx} = 4\sigma_{xx}$.

Only in the case where the two countries' aid budgets are perfectly correlated will we get $\sigma_{xy} = \sigma_{xx}$; failing this, $\sigma_{xy} < \sigma_{xx}$. This explanation suggests that aid volatility will generally be less the greater the number of donors (Hudson and Mosley, 2008). Thus, aid fragmentation could be used by recipient governments as an insurance policy against aid volatility, reducing the chance of severe aid shocks.

According to Buffie et al (2010) this strategy will send a signal to the private sector which determines the success of the fiscal management of aid (more about this later), and intuitively we assume that more the donors are different (in their characteristics and in their allocation criteria) more the credibility signal to the private sector would be greater. Thus, welcoming emerging donors could be a fiscal strategy that helps recipients to improve their aid management policy.

To test this hypothesis we consider a policy response model as defined by the IMF and Hussain et al. (2009) to investigate how emerging donors' aid could influence fiscal management in recipient countries.

3.4. Aid Fragmentation, Credibility Signal and Fiscal Response to Aid

Donors are concerned about how their aid is used, especially how it affects the fiscal behavior of recipient governments. The internal pressures to spend aid money as soon as it arrives are very strong. Moreover, donors are also highly averse to fiscal prudence; they want to see their money spent doing good, not piling up as reserves in central bank vaults (Buffie et al, 2010).

The IMF uses a '*spend and absorb'* framework to classify macroeconomic responses to an aid surge[9]. Hussain et al (2009) defined '*Absorption*' as the extent to which the current account deficit, excluding aid, increases in response to an increase in aid inflows. This measure captures the quantity of net imports financed by an increment in aid, which represents the real transfer of resources enabled by aid.

'*Spending*'of aid is defined as the increase in government fiscal deficit (net of aid) that accompanies an increment in aid. Spending captures the extent to which the government uses aid to finance an increase in expenditure or a reduction in taxation. Even if the aid comes tied to particular expenditure, governments can choose whether or not to increase the overall fiscal

[9] 'Spend' is defined as the increase in the primary fiscal deficit and 'Absorb' as the increase in the current account deficit; both measured as a percentage of the increase in aid. The IMF recommends that the central bank sells all the aid dollars and that the central government spends all the counterpart funds (i.e. the domestic currency proceeds of the aid).

deficit as aid increases. The aid-related increases in expenditure could be on imports or domestically produced goods and services[10].

Hussain et al (2009) discussed four potential scenarios based on these two concepts[11]: "*Aid absorbed and spent*", "*Aid neither Absorbed nor Spent*", "*Aid absorbed but not Spent*" and "*Aid Spent but not Absorbed*". The two "*Not Spent*" policies are unsustainable because donors want their aid spent, and ignore that could provoke a suspension of aid. The IMF recommends that the central bank sells all the aid dollars, and that the central government spends all the counterpart funds (first scenario).

This framework emphasizes the need to coordinate fiscal policy with monetary and exchange rate policy in order to minimize potential adverse effects. The macroeconomic impact of aid depends critically on the policy response to aid.

However Buffie et al (2010) explained that the private sector is aware of the connection between aid surges and the path of the fiscal deficit. Thus, private agents have ample grounds to fear that today's aid surge could threaten future fiscal stability. Furthermore, the success of the macroeconomic management option depends also on a strategy for managing private sector expectations about the end of the aid surge. This hypothesis helps to explain the empirical evidence about fiscal response to aid in recent studies. Berg et al (2007) and Foster

[10]Analyzing spending is important because of the natural focus on the budget as a policy variable, and also because of the importance of tensions between the fiscal policy response to aid and broader macroeconomic objectives with respect to the exchange rate and inflation (Hussain et al, 2009)

[11]*Absorb and spend aid*. The government spends the extra aid inflow – either through higher public spending, lower domestic revenue (e.g.cutting taxes), or a mixture of both – while the central bank sells the foreign exchange in the currency market.

Absorb but not spend aid. The government decides not to spend the aid inflow, the central bank sells the foreign exchange. Foreign aid is thus used to reduce the government's seigniorage requirement since it substitutes for domestic borrowing for financing the government deficit.

Spend and not absorb aid. The government spends the additional aid inflow (non-aid fiscal deficit increases), the central bank allows its foreign exchange reserves to increase. In this case, the extra foreign exchange is not made available to importers, but instead it is used to build up international reserves.

Neither absorb nor spend aid. The government does not use the additional aid inflow to increase the non-aid fiscal deficit, the central bank increases its foreign exchange reserves.

& Killick (2006) found that the current account deficit typically increases by less than half of the rise in aid flows, and that aid surges often coincide with large capital outflows; most aid appeared to finance capital flight, rather than an increase in net imports.

The purpose of this section is to propose an explanation of recipients' attitudes to welcoming emerging donors (as a credibility signal to the private sector), and to explain how the emergence of non-DAC donors could be used by recipients as a strategy to improve the impact of their fiscal response to aid flows. These explanations will give a full understanding of our previous findings on fiscal variables in Section 2.

3.4.1.Theoretical framework

Our model derives from the conceptual framework in Buffie et al (2010) and Berg et al (2007).

All economic decisions in the private sector are assumed to be controlled by a representative agent who maximizes his expected lifetime utility and has preferences over a composite bundle of tradable and non-tradable goods, thus :

$$U = E_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\sigma}}{1-\sigma}$$

where $C_t = \left[\omega (C_t^T)^{-\mu} + (1-\omega)(C_t^N)^{-\mu}\right]^{-1/\mu}$ is a constant elasticity of substitution (CES) aggregator function, and ω is the weight households place on tradable consumption. The elasticity of substitution of consumption between tradables and non-tradables is 1/(1+μ).

The private agent receives labor income, rents capital to firms, and makes investment decisions. In addition, the private sector receives lump-sum transfers from the government.

Thus, the private agent chooses asset holdings and expenditure that maximize his utility with the following wealth and budget constraints (WC and BC respectively):

$$\text{WC}: W = m + \left(p/e\right) * b + F$$

$$\text{BC}: \dot{W} = pC + g + r * \left(p/e\right) * b - \chi m$$

whereχ=ė/e is the rate of currency depreciation, m≡M/e, M is domestic currency, r is the real interest rate, g is real lump-sum transfers received from government, foreign currency is F, and government bonds is B. Bonds are indexed to the price level P, so B=Pb, where b≡B/P.

* *Aid, public sector, and reserve accumulation*

When aid flows increase from X_0 to X_1 at t=0, the government and the private sector make expectations about the end of the aid surge with probabilities p_g and p_p. These probabilities determine the proportion of the increased aid spend by the government, or used as buffer stocks in central bank reserves, but also the success of the fiscal management policy of government due to the credibility level accorded by the private sector.

Thus we have, the following system

Public transfer: $g_1 = g_0 + \psi(X_1 - X_0)$ ψ<= 1

Reserves: $\dot{Z} = (1 - \psi)(X_1 - X_0)$

ψ determines the fiscal management scenario chosen by the government, and according to Buffie et al. (2010) even in the best-case scenario the success of aid surge management depends on private agent expectations about government capability, and fears about a future

period of large fiscal deficits and high inflation, while the government is struggling to curtail expenditure after the end of the aid surge.

Following the "*absorb and spend*" scenario of Hussain et al. (2009) the government spends the extra aid inflow, and the central bank sells the foreign exchange in the currency market - corresponding to $\dot{Z}=0$ and ψ=1:

(1) In the full credibility case, the public sector budget constraint is

$$\dot{m}+\frac{p}{e}\dot{b}-\dot{Z}=g_1+\frac{p}{e}rb-X_1-\chi m \text{ with } \dot{b}=\dot{Z}=0$$

$$\dot{m}=g_1+\frac{p}{e}rb-X_1-\chi m$$

(2) low credibility case:

As shown by the wealth constraint, the private sector divides its wealth between domestic currency M, foreign currency F, and government bonds B. Therefore, in a low credibility period, private agents believe that the aid surge is temporary, and have concerns about the government's capacity for expeditious fiscal retrenchment (Buffie et al, 2010).

They move their wealth allocation towards F and M, generating capital flight and high inflation[12]. Thus, the public sector budget constraint becomes:

$$\dot{m}=g_1+\frac{p}{e}rb-X_1-\frac{p}{e}\dot{b}-\chi m$$

[12]Country studies recently completed by Berg et al (2007) and Foster & Killick (2006) found that the current account deficit typically increases by less than half of the rise in aid flows and that aid surges often coincide with large capital outflows. These are disconcerting correlations. The current account deficit has to increase by the same amount as aid to effect a complete transfer of resources. The case study data indicate that this did not happen; most aid appeared to finance capital flight rather than an increase in net imports.

A part of the fiscal deficit is now financed by issuing debt. The intuition here is that the increase in current account deficit (CAD) will be higher in the full credibility scenario:

$CAD_{FC} > CAD_{LC}$,

where $CAD = C+g - Investment - (Transfert+Income) - (r_{t-1}-1)b_{t-1}/\pi$; (Berg et al. 2010).

If the private sector fears that after the aid surge there might be a period of large fiscal deficits and high inflation, their expectations could lead to capital outflows and the failure of the "absorb-spend" policy.

Given that the effectiveness of aid flow macroeconomic management depends also on private sector expectations, we want to investigate if welcoming emerging donors could be used by recipient countries as a strategy to influence private sector anticipation (by sending a signal that there would not be a collapse in aid flows) and so achieve better aid management.

Increased aid can serve some combination of three purposes: an increase in reserve accumulation, an increase in capital outflows, and an increase in the non-aid current account deficit (Hussain et al 2009). The rate of absorption of an increase in aid is then defined as the change (Δ) in the current account (excluding aid) deficit as a share of the change in aid inflows:

$Absorption\ of\ aid = \Delta(Non\text{-}aid\ current\ account\ deficit)/\Delta Aid.$

For a given fiscal policy, absorption is controlled by the central bank, through its decisions about how much of the foreign exchange associated with aid to sell, and through its interest

rates policy, which influences the demand for private imports via aggregate demand, but also depends on private sector behavior as explained above.

'Spending'of aid is defined as the increase in the government fiscal deficit, net of aid, that accompanies an increment in aid:

$$Spending\ of\ aid = \Delta(Total\ expenditures - Domestic\ revenue)/\Delta Aid.$$

3.4.2 Empirical evidence

We will use here the econometric structure briefly describe in Section 2, with our dependent variables being now "Absorption" and "Spending" as defined above. Previous studies have found that the response to an aid surge is bad in countries with weak records of macroeconomic stability and low levels of international reserves (Hussain et al, 2009). We control for additional factors including the level of official reserves, the existing debt burden and the current level of inflation.

The macroeconomic response to aid is shaped by the government's spending decisions and the monetary authority's choices regarding reserve accumulation and bond operations, given the endogenous response of the private sector. As shown in Table 5, the presence of emerging donors in aid markets could serve recipient governments by sending a credibility signal to the private sector, and thus modify the fiscal response to aid. The first column reports estimates of the absorption rate equation. The coefficient for the non-DAC aid variable is positive and statistically significant, suggesting that countries welcoming emerging donor aid increase their absorption rate.

Hussain et al, (2009) suggested that "absorb and not spend" the aid might be an appropriate response if domestic debt is too large; this finding corroborates the positive and statistically significant coefficient of the "short-term debt" in the absorption rate equation. We also find that inflation reduces the absorption rate and the level of reserves in the central bank.

Our spending equation does not seem to provide any valuable information, the data availability problem is more severe with the spending variable.

3.5. Conclusion

We started this analysis with arguments critical of the increasing influence of emerging donors in aid allocation to LICs, assuming that this situation would undermine macroeconomic management in these countries. Empirical evidences show that in practice fiscal authorities in LICs do not behave as a "victim" of this evolution in aid architecture, but appear to welcome these new donors.

Our findings suggest that non-DAC aid allocation is generally associated with a change in government borrowing behavior. This result recalls the fear of debt unsustainability in countries welcoming emerging donors' aid expressed by Manning (2006), Moses (2007) and others. However, we find no strong evidence that non-DAC aid undermines tax revenue, and on the contrary it seems that the presence of emerging donors leads to an improvement of government fiscal effort. The most surprising result concerns the current account equation. The results indicate that an increase in non-DAC influence in aid allocation leads to an increase in current account deficit. This means that the presence of emerging donors increases the real transfer of resources to recipient governments, either directly via imports or indirectly via increases in public expenditure. To understand these counter-intuitive findings, we move our analysis to an Absorption-Spending framework.

As explained in Buffie et al (2010), donors insist on seeing their aid spent rapidly, when at the same time the fiscal authorities of the recipient country face a potentially serious credibility problem, because the private sector anticipates fiscal pressures after the end of the aid surge. Given that private sector expectations also determine the success of the macroeconomic response to aid, governments should find ways to manage these expectations. As we know from Hudson and Mosley (2008), aid fragmentation could serve as an insurance against aid

volatility, reducing the chance of an end to the aid surge. Thus, welcoming new donors sends a credibility signal to private agents, so avoiding capital flight and higher inflation rates. We find that countries receiving aid from emerging donors modify their fiscal response to aid, in particular through an increase in their aid absorption rate.

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Appendix

Results

Note: Robust standard errors - the asterisks represent significance at the 10 per cent (*), 5 per cent (**), and 1 per cent (***) confidence levels.

Table 1 : Current Account Equations

	Sys-GMM	PMG
CA (t-1)	0.46 (0.00) ***	0.26 (0.00) ***
GDP growth	0.005 (0.94)	0.02 (0.88)
Gov size	0.001 (0.99)	0.32 (0.20)
Imports	-0.46 (0.00) ***	-0.16 (0.03) **
Savings	0.34 (0.03) **	0.51 (0.00) ***
Financial openness	-0.084 (0.91)	1.19 (0.18)
Aid fragmentation	-6.18 (0.07) *	4.46 (0.28)
nonDAC influence	-0.006 (0.05) *	-0.15 (0.09) *
Observations	1411	1384
AR(2)	0.14	
Hansen	0.19	
Instruments	23	
Number of countries	63	59

Table 4 : Public Investment Equations

	Sys-GMM	PMG
Public investment (t-1)	0.65 (0.00) ***	0.25 (0.00) ***
GDP growth	0.01 (0.69)	0.025 (0.72)
Gov size	0.06 (0.38)	-0.11 (0.30)
Imports	0.10 (0.03) **	0.024 (0.49)
Savings	0.06 (0.00) ***	0.016 (0.62)
Aid fragmentation	0.49 (0.62)	-0.29 (0.83)
nonDAC influence	0.01 (0.26)	-0.07 (0.60)
Observations	1368	1361
AR(2)	0.88	
Hansen	0.50	
Instruments	20	
Number of countries	60	59

Table 2 : Borrowing Equations (dep var= ratio lend/borrow)

	Sys-GMM	Sys-GMM	PMG
GDP growth	0.07 (0.00) ***	0.067 (0.05) *	0.26 (0.02) **
Gov size	-0.37 (0.00) ***	-0.34 (0.01) **	-0.46 (0.13)
Imports	0.003 (0.92)	-0.008 (0.70)	-0.08 (0.53)
Savings	0.15 (0.00) ***	0.16 (0.00) ***	-0.08 (0.59)
Financial openness		-0.56 (0.31)	
Aid fragmentation	0.36 (0.86)	-0.13 (0.96)	1.82 (0.72)
nonDAC influence	-0.01 (0.04) **	-0.009 (0.08) *	-0.21 (0.31)
Observations	1041	908	1023
AR(2)	0.52	0.63	
Hansen	0.14	0.046	
Instruments	20	23	
Number of countries	64	63	60

Table 3: Taxation and Fiscal Effort Equations

	Tax revenue			Fiscal effort	
	Sys-GMM	PMG	FE	Sys-GMM	PMG
GDP (t-1)	2.34 (0.09) *	2.69 (0.53)	0.042 (0.92)		
Agri value added	-0.28 (0.01) **	0.24 (0.31)	-0.13 (0.00) ***		
Imports	0.86 (0.53)	3.86 (0.23)	3.01 (0.00) ***		
Savings	-0.02 (0.37)	0.045 (0.51)	0.004 (0.77)	-0.014 (0.56)	0.18 (0.33)
M2	-0.006 (0.92)	0.018 (0.77)	0.028 (0.05) *		
Gov size				-0.18 (0.60)	-0.10 (0.89)
Human capital				-0.19 (0.31)	0.83 (0.48)
GDP per capita				0.003 (0.54)	-0.059 (0.64)
Aid fragmentation	-4.80 (0.06) *	-4.63 (0.21)	-1.13 (0.26)	0.79 (0.83)	-0.012 (0.99)
nonDAC influence	0.001 (0.99)	-0.11 (0.44)	-0.003 (0.00) ***	0.003 (0.07) *	3.11 (0.33)
Observations	1054	1043	1054	594	522
R2			0.41		
AR(2)	0.12			0.17	
Hansen	0.14			0.47	
Instruments	20			17	
Number of countries	61	54	61	56	38

Table 5: Absorption and Spending Equations

	Absorption				Spending
	Sys-GMM		FE	RE	Sys-GMM
GDP per capita		-0.016 (0.30)	0.046 (0.28)	-0.003 (0.46)	-0.003 (0.42)
Gov size	0.25 (0.87)		-1.86 (0.19)	-0.45 (0.24)	-0.18 (0.62)
GDP growth	-0.89 (0.39)		-1.77* (0.05)	-1.41* (0.06)	0.97 (0.24)
Savings	0.36 (0.40)	-0.17 (0.14)	0.73 (0.20)	0.56* (0.10)	-0.59 (0.15)
Financial openness	2.75 (0.31)	7.07 (0.25)	8.65 (0.34)	2.66 (0.33)	
Short-term debt	0.005*** (0.00)	0.004*** (0.00)	0.007*** (0.00)	0.006*** (0.00)	0.001 (0.27)
Inflation	-0.69* (0.10)		-0.17 (0.18)	-0.20 (0.15)	-0.50 (0.15)
FDI		0.63 (0.72)			
Trade intensity with Emerging Donors		0.0003 (0.24)			
Variation of reserves	-0.0001* (0.05)				
Aid fragmentation	33.7 (0.20)	23.1 (0.46)	-1.42 (0.94)	22.6 (0.19)	16.8 (0.20)
nonDAC influence	**0.02 ** (0.048)**	**0.03* (0.09)**	**0.067* (0.05)**	**0.017* (0.08)**	**0.004 (0.76)**
Observations	1000	982	1020	1020	643
AR(2)	0.85	0.59			0.72
Hansen	0.70	0.57			0.34
Instruments	30	25			27
Number of countries	58	60	60	60	61

Summary Statistics of Aid and Fiscal Variables:

Variable	Mean	SD	Min	Max
CA	-6.18	10.80	-124.56	34.84
Lend/Borrow	-3.00	7.07	-46.23	125.44
Tax revenue	18.81	8.48	1.3	59.9
Public investment	7.57	5.72	0.076	50.62
NDAC influence	0.073	0.56	-24.25	10.46
AF index	0.68	0.18	-0.63	1

Data details:

Variable	**Definition**	**Source**
nonDac Influence	Share of nonDAC aid in total ODA	OECD-CRS
nonDAC ODA	ODA received from emerging donors	OECD-CRS
CA	Current account balance (% GDP)	WEO
Variation of reserves	Change in international reserves	WEO
Borrowing	General government net lending/borrowing ratio (% GDP)	WEO
Financial openness	Chinn-Ito Financial Openness Index	Chinn and Ito (2006)
AF index	Aid fragmentation index	Authors
Human capital	Human asset index (HAI)	CERDI
Imports	Imports of goods and services (% of GDP)	WDI
Trade intensity	Bilateral trade	IMF-DOTS
FDI	Foreign direct investment ((% of GDP)	WDI
Inflation	Inflation rate (CPI, percentage change)	WDI
Gov size	General government final consumption expenditure (% of GDP)	WDI
GDP per capita	Gross domestic product per capita	WDI
Public Investment	Public Investment	IMF-IFS
Tax revenue	Tax revenue (% GDP)	WDI-CERDI
Savings	Gross savings (% GDP)	WDI
Short-term debt	Short-term debt (% GDP)	WDI
M2	Money and quasi money (% of GDP)	WDI
Agri value added	Agriculture, value added (% of GDP)	WDI

List of Countries:
Afghanistan, Angola, Burundi, Benin, Burkina Faso, Bangladesh, Belize, Bolivia, Bhutan, Central African Republic, Côte d'Ivoire, Cameroon , Republic of Congo, Republic Democratic of Congo, Comoros, Cape Verde, Djibouti, Egypt, Eritrea, Ethiopia, Fiji, Ghana, Guinea, Gambia, Guinea-Bissau, Equatorial Guinea, Guatemala, Guyana, Honduras, Haiti, Indonesia, India, Iraq, Kenya, Cambodia, Kiribati, Lao People's Democratic Rep, Liberia, Sri Lanka, Lesotho, Morocco, Moldova, Madagascar, Marshall Islands, Mali, Myanmar, Mongolia, Mozambique, Mauritania, Malawi, Niger, Nigeria, Nicaragua, Nepal, Pakistan, Philippines, Papua New Guinea, Korea Democratic Rep, Paraguay, Rwanda, Sudan, Senegal, Solomon Islands, Sierra Leone, El Salvador, Somalia, São Tomé and Principe, Swaziland, Syrian Arab Republic, Chad, Togo, Timor-Leste, Tonga, Tuvalu, Tanzania, Uganda, Vietnam, Vanuatu, Samoa, Yemen, Zambia, Zimbabwe.

Chapter 4. Emerging Donors and Evolution of the Aid Architecture

Abstract:

This paper describes the behaviour of DAC donor in dealing with the increasing influence of non-DAC donors in development cooperation. Using both multilateral and bilateral aid data, the results show the importance of political and strategic interests in the competition between DAC and emerging donors. Furthermore, our empirical investigations assess the implications of these interactions between donors on the quality of DAC aid allocation from a recipient perspective.

Keywords: *Emerging Donors, Aid Effectiveness, Strategic interests, Competition, Aid allocation*

4.1. Introduction

The DAC (Development Assistance Committee) has established a wide array of principles, standards and procedures resulting in a complex system governing its relations with aid recipient countries. The Paris Declaration of 2005 represents a recent manifestation, calling for various steps to be taken by donors and recipients to render aid more effective.The DAC consensus on aid allocation was about prioritizing aid towards poverty reduction and the needs of the poorest countries. It downplayed the role of aid in pursuing the strategic and political interests of the donors. Indeed, during the past two decades DAC donors have agreed to protect the poverty and development focus of aid programmes from the influence of other policy priorities, such as trade and investment. However, the challenge for development cooperation goes far beyond aid principles and the DAC consensus. The underlying challenge arises from a combination of the emergence of new economic and political powers, and a radically changing global situation (Humphrey, 2011).

The policies that many DAC donors have encouraged recipients to follow, embodied in the Washington Consensus, have been subject to growing debate, provoking a global competition between new ideas and new policy models (Birdsall and Fukuyama 2011). Developing countries have begun to look beyond the DAC for policy ideas. Therefore, the emergence of alternative sources of financing and policy models has intensified researchers' and practitioners' attention on this evolution in development cooperation. This paper proposes a contribution to this debate.

According to Paulo and Reisen (2010), more than 30 donor countries operate outside the DAC (a 50 year old club of 'established donors[1]'). We will use the term "non-DAC donors"

[1]The 24 members of the Development Assistance Committee (DAC) are : - Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA and European Union Institutions (OECD, 2011).

to describe these actors, even if it defines the group by what they are not, rather than by what they are[2].

Zimmermann and Smith (2011) pointed out that it remains difficult to weigh up the opportunities and risks brought by non□DAC donors until more information is available about their actions. Nevertheless, overall estimations for the non-DAC donors (hereafter NDDs) range from $11 billion to $41.7 billion per year, between 8 percent and 31percent of global gross ODA, implying that China, Brazil, and Saudi Arabia give more ODA than half of the DAC donors. Four NDDs (Venezuela, Saudi Arabia, United Arab Emirates (UAE), & China) reach the UN target of 0.7 percent of GNI; a benchmark that 18 of the 23 DAC member countries do not reach (Walz & Ramachandran, 2010). At 8-10 percent of total ODA, the overall volume of NDD development cooperation flows remains relatively low. However, looking at specific developing countries reveals a very different picture. In Yemen, for example, the United Arab Emirates alone accounted for 33 percent of total gross ODA flows in 2009 (OECD, 2011). In Asia, traditional donors (e.g. Japan) are no longer overwhelmingly dominant in terms of aid volume. China, India, Korea, and Thailand are now key sources of foreign aid to poorer countries such as Cambodia, Laos, and Myanmar (Sato et al, 2011). A look at specific sectors is also instructive. China and Saudi Arabia, have dominated the provision of infrastructure in recent years, while at the same time DAC donors have prioritized aid for social sectors (Foster et al, 2009; IMF, 2011).

The increasing influence of NDD donors in development cooperation has elicited two opposing reactions, resumed in the following quotations:

[2]Zimmermann and Smith (2011) give a good introduction to these emerging donors.

"…If they continue to succeed in pushing their alternative development model, they will succeed in underwriting a world that is more corrupt, chaotic, and authoritarian." (Naim, 2007)

"[The DAC] should welcome, not discourage, a greater role by donors outside DAC (…)The DAC should not aspire to be a donors' cartel. Greater choice for developing countries is in principle good." (Manning, 2006).

Advocates of DAC practices are concerned by their impact on governance standards and public management systems in recipient countries. They think that the governments of recipient countries which have weak rule of law, particularly those with abundant natural resources, have gained greater freedom to circumvent governance reforms (recommended by DAC), and ignore the protection of human rights and environmental standards (Manning, 2006; Naim, 2007; Chileshe, 2010). The increased complexity of the donor community at the country level is particularly demanding for recipient governments with weak public financial management systems. These countries may accept new loans from NDDs, which lead to unsustainable levels of debt and undermine recent global efforts to provide debt relief to highly indebted countries. Paulo & Reisen (2010) and Woods (2008) called for a more nuanced discussion about these policy concerns. They find little concrete evidence that the arrival of NDDs has undermined governance standards. Moreover, they question whether DAC donors have themselves been successful in promoting better governance through their use of conditionality.

If the debate about emerging donors focuses on the implications for aid recipients[3], it would be interesting to understand how traditional donors manage in this situation. We choose in this paper to analyze the emergence of new donors from the DAC donors' perspective. This

[3]Kragelund (2008), Sato et al (2011), Zimmermann & Smith (2011).

aspect of the debate is interesting because it contributes to the literature on the determinants of aid allocation, and explicitly assesses the importance of political and strategic interests in development cooperation.

The aim of our paper is twofold. First, we revisit aid allocation motives through competition between DAC donors and emerging donors. Second, we evaluate how the increasing influence of NDDs affects the quality of DAC aid allocation. We use both multilateral and bilateral panel data to highlight the heterogeneous strategic reactions between DAC donors and emerging donors.

This paper is structured in the following way: The next section reviews the theoretical and empirical background in aid allocation literature. Section 3 describes the empirical methodology and data. Section 4 presents the estimation results including some sensitivity analysis. Section 5 offers a discussion on the consequence of the competition between donors for the quality of aid. Then concluding comments are provided.

4.2.Literature Review and Methodological Issues

4.2.1. Background

After cold war, a common interpretation is that donor agencies are now freer to pursue developmental or humanitarian as opposed to political, strategic commercial and related criteria in aid allocation. In short, these agencies now allocate more aid to countries which can use it better, so that aid would work in promoting growth.Several papers have addressed the issue of aid allocation to recipient countries. The most influential, widely-cited studies are those of McKinley (1978), McKinley and Little (1977) which have introduced the debate on the factors influencing aid allocation and have structured the discussion around the recipient needs and the donor interest.

The determinants of foreign aid allocation have received much attention in the development literature since the 1970s. The majority of work in this area has claimed that donor self-interest plays a large role in determining how much aid a country receives, potentially undermining the efficiency of development aid.The best known of these aid allocation studies is Alesina and Dollar (2000), who suggest that bilateral donors care more about strategic and historical factors than the developmental needs of aid recipients. Their estimation relied on ordinary least squares (OLS) and thus was potentially biased due to the presence of time-invariant unobservables correlated with explanatory variables;nevertheless they were confirmed by McGillivray (2003), Berthélemy and Tichit (2004), Younas (2008), Hoeffler and Outram (2011) and others.

4.2.2. Modelling in aid allocation studies

Most of these studies are extensions of Dudley and Montmarquette's (I976) model of individual donor optimization to one of simultaneous optimization by multiple donors. In these studies, the aid allocation of donors is motivated by recipient well-being and donor self-interest, as follows:

Consider a multilateral aid allocation model using a single objective function of the impact of aid from all j donors to m recipients. Let assume that all donors pool their aid budgets, and a representative donor decides how much of that is to be allocated to a recipient every year.

Let H be the sum of the impact of the donor's aid on its own welfare, the problem faced by the donor is

$$Maximize \quad H = \sum_{j=1}^{m} \omega_j h_j = \sum_{j=1}^{m} \omega_j h_j \left(a_j, n_j, m_j, s_j\right) \tag{1}$$

where,

h_j = *subjectively measured impact of aid on the recipient country j*

a_j = aid received by the recipient j
n_j = vector of recipient j needs (income level, population, human capital, or economic vulnerability)
m_j = vector of merit : measure of the policy environment in the recipient country j (economic performance, human rights)
s_j = vector of donors' self-interest (trade openness, imports, natural resources)
ω_j = weighted measure of the importance of recipient j in the eyes of donors.

This model is based on the assumption that, other things being equal, the impact of aid is an increasing function of the aid that a recipient nation receives; the more the aid is needed, the more a country will benefit from an additional unit of aid. The vector of merit m_j is included based on Burnside & Dollar's (2000) results on the importance of a good policy environment for aid to be effective. Several papers have addressed this issue and identified some important recipients' characteristics for aid allocation, such as political and economic institutions (Alesina & Weder, 2002; Bandyopadhyay & Wall, 2007), adherence to human rights norms (Neumayer, 2003), internal armed conflict (Balla & Reinhardt, 2008); and the shared characteristics between donors and recipient countries, such as colonial ties (Alesina & Dollar, 2000). Thus, economic, political, and other linkages (colonial history, cultural affinity, strategic values, geographic location, etc.) between donors and recipients determine the weighted measure of the importance of a recipient in the eyes of donors (Younas, 2008; Harrigan & Wang, 2011).

The impact of aid on recipient j can be specified as follows :

$$h_j\left(a_j, n_j, m_j, s_j\right) = a_j^{\alpha} n_j^{\delta} m_j^{\gamma} s_j^{\tau} \qquad (2)$$
$$0 < \alpha < 1, \qquad 0 < |\delta| < 1, \qquad 0 < |\gamma| < 1, \qquad 0 < |\tau| < 1$$

As noted above, the supply behaviour of aid from multiple donors is expressed as an impact maximization problem of a single donor where all donors pool their budget for aid. Thus, the budget constraint of the donor takes the following form:

$$\sum_{j=1}^{m} a_j = B \qquad (3)$$

Then the problem faced by the donor can be expressed as

$$Maximize \quad L = \sum_{j=1}^{m} \omega_j (a_j^{\alpha} n_j^{\delta} m_j^{\gamma} s_j^{\tau}) + \quad \lambda \left(B - \sum_{j=1}^{m} a_j \right) \tag{4}$$

The first order conditions are

$$\frac{\partial L}{\partial a_j} = \alpha \omega_j (a_j^{\alpha-1} n_j^{\delta} m_j^{\gamma} s_j^{\tau}) - \lambda = 0 \tag{5}$$

$$\frac{\partial L}{\partial \lambda} = B - \sum_{j=1}^{m} a_j = 0 \tag{6}$$

Equating (5) and (6) gives the optimal allocation of aid for a recipient j

$$a_j^* = \left(\alpha \omega_j \frac{n_j^{\delta} m_j^{\gamma} s_j^{\tau}}{\lambda} \right)^{\frac{1}{1-\alpha}} \tag{7}$$

Taking the log transformation and introducing an error term, we write Equation (7) as follows:

$$\ln a_j^* = \beta_0 + \beta_j + \eta_t + \beta_1 \ln(n_j) + \beta_2 \ln(m_j) + \beta_3 \ln(s_j) + \varepsilon_{it} \tag{8}$$

where $\beta_0=(1/1-\alpha)\ln\alpha$, $\beta_j=(1/1-\alpha)\ln\omega_j$, $\beta_1=\delta/1-\alpha$, $\beta_2=\gamma/1-\alpha$, $\beta_3=\tau/1-\alpha$, $\eta_t=-(1/1-\alpha)\ln\lambda_t$.

In reality, donor aid allocation is determined by factors that influence the perceived impact of aid. Furthermore, the allocation of aid is subject to informational time lags. Decision makers can only base their decisions on the information currently available and in the case of most variables (especially those relating to needs), this information will, at best, be for the year prior to that for which the aid is allocated. (Berthélemy & Tichit, 2004; Younas, 2008; Hoeffler &Outram, 2011).Therefore, authors also considered a bilateral model where a recipient country does not have the same weight for all donors (ω_{ij} # ω_j).

Feeny & McGillivray (2008) describe how bilateral aid allocation is complex. In fact, there are decision-making groups of donor aid agencies which have the task of ensuring both the

developmental need objective of aid, and the self-interest of donors (commercial, strategic, political). Furthermore, the benefit to the donor country may depend on the social, economic and political linkages with the recipient. Thus, the parameter α introduced in the maximization equation, to reflect recipient-specific considerations in the determination of aid flows, should be different by donor (α_i # α). The implication of this parameter $\alpha_i$is that the β coefficients attached to the recipient needs and donor interests variables determining aid allocation, are allowed to vary across donors[4], as follows:

$$\ln a_{ijt}^{*} = \beta_0 + \beta_{ij} + \eta_{t-1} + \beta_{i1} \ln(n_{j,t-1}) + \beta_{i2} \ln(m_{j,t-1}) + \beta_{i3} \ln(s_{j,t-1}) + \varepsilon_{it} \quad (9)$$

The fact of distinguishing these two models will allows us to take account of the heterogeneity of donors and of their relations with recipient countries in our analysis of the reaction of DAC donors to the emergence of new donors.

4.2.3. Estimation issues

The aid allocation literature examines the Need, Merit and Self-interest approach using two types of models. The Type I model describes a one-stage process, where the donor deliberates simply between positive and zero aid amounts without first compiling a sample of countries which shall receive aid.

The Type II (sample selection) model describes a two-stage decision-making process in the context of aid allocation. In the first stage, the donor selects from a list of potential recipients a sample of countries which shall receive aid. Having done this, the donor in the second stage decides how much aid to allocate to each of these countries from a predetermined total pool of funds. Each of these countries receives a positive amount of aid.

Given that donors tend to allocate aid only to specific targeted countries, data on aid allocation include countries that do not receive aid from all donors (i.e. the aid variable is zero

[4]Feeny & McGillivray (2008) discuss this issue.

for a large number of cases), and so we face a potential sample selection problem. McGillivray (2002) discusses the estimation options and problems in detail. A number of recent studies have adopted a Tobit model, for example, Alesina & Dollar (2002), Thiele, Nunnenkamp, & Dreher (2007), Berthélemy & Tichit (2004). This model treats the decision on eligibility and the decision on amounts as a single simultaneous process. However, there are a number of potential difficulties with this approach. The Tobit model relies crucially on the assumptions of normality and homoscedasticity in the underlying latent variable model (Harrigan & Wang, 2011).

Some authors like Berthélemy (2006) or Fleck & Kilby (2010) used two-stage estimators to tackle this issue; estimating the selection decision first, then the allocation decision second. Hoeffler and Outram (2011) explain that studies that have followed this two-stage Heckman procedure do not found significant improvement in their results because in aid allocation the factors determining the selection and the allocation are broadly the same. Thus given that few studies have found that there are significant differences from estimation using OLS, Younas (2008) prefers the pooled ordinary least squares (POLS) technique to assess the determinants of bilateral aid allocation.

Anyway, one also needs to be aware of the potential simultaneous causation between the dependent variable (Aid) and some independent variables (e.g. Trade, Imports, Income or Multilateral aid), or reverse causality[5].

[5]The lagging of independent variables also reduces the potential problem of simultaneity and contemporaneous correlation in the empirical model.

4.3.Empirical Methodology and Data Description

Before describing our empirical analysis, we provide in this section an overview of the implications of the emergence of new donors for aid allocation.

In the context of slow growth and fiscal tightening, it will not be easy for industrialized countries to maintain public support for the current levels of development aid. Furthermore, the rapid economic growth in emerging countries will increase the possibility of competition for scarce resources (Humphrey, 2011), because It is clear from these previous studies that aid is not just about poverty reduction. Researchers have investigated the role of donor preferences such as geo-political interests (Alesina & Dollar, 2000; Dreher et al, 2009); economic self-interest (Younas, 2008). Given the strategic and commercial interests discussed in previous studies, the emergence of NDDs will induce reactions from traditional donors according to the perception they have of these new actors.

Steinwand (2010)[6] propose a theory that summarizes donors' strategic reactions to the proliferation of new actors in development cooperation. He distinguished two reactions for donors *acting as lead donor for a given recipient country.In the first scenario, leaders have aligned incentives, and aid is used to produce public goods. This means that donors, who give aid to foster things like economic development, reduce infant mortality, increase literacy, etc., cannot exclude other donors from enjoying success in these areas.In the second scenario, aid helps to secure benefits that are exclusively enjoyed by the donor.A central feature of the private uses of aid is that donors who try to obtain the same sort of benefit should be locked in competition with each other.*

[6] Work in progress, presented at the 68th Annual MPSA National Conference, Chicago, April 2010.

This theory suggests that the DAC donors will react to the increasing influence of non-DAC donors in development aid. These DAC donor reactions will vary across time, and will depend on the importance they give to countries, regions or specific sectors.

4.3.1. Empirical strategy

In order to describe the DAC donor reactions to the emergence of new donors in development assistance, we will use multilateral and bilateral model specification. We present here the bilateral aid allocation model proposed by Berthélemy & Tichit (2004) and Hoeffler & Outram (2011):

$$AID_{ijt} = \theta_i + \beta_{ik} X_{ijt} + \eta_j + D_i + u_{ijt} \quad (10)$$

where subscript i denotes donor, j denotes the recipient, and t time. X_{ijt} represents a vector of explanatory variables, θ_i a constant, and u_{ijt} the error term. The β_k coefficients vary across donors because recipients do not have the same value in the eyes of different donors (as explained in the previous section).

D_i is a donor dummy variable introduced for all donors in the bilateral approach. After the gravity model specification, we also estimate separate equations for each of the G7 donors in order to compare individual strategic behaviours. This enables us to compare the coefficients across these donors, and examine whether they allocate aid differently.

We also compare the individual behaviour of donors using the following extended model:

$$AID_{ijt} = \theta_i + \beta_{ik} X_{ijt} + \eta_j + D_i + \gamma D_i \cdot X_{ijt} + u_{ijt} \quad (11)$$

Thus for our empirical analysis, we use two different samples. First, we use recipient/year observations on multilateral DAC aid commitments. DAC Members' multilateral aid are contributions to the regular budgets of the multilateral institutions. These data are available in

the aggregated DAC statistics. Second, we use the bilateral aid allocation by G7 donors (the most important DAC donors) in order to contrast the global DAC aid allocation policy with individual strategic reactions to the emergence of new donors.

Variable of interest

The aim of this analysis is to assess the effect of emerging donors aid allocation on the aid allocation behaviour of DAC members. So, we need to add to the previous equation variables measuring the evolution of NDDs in development cooperation. To capture the influence of emerging donors on development aid, we use two variables:

-the share of NDD ODA in total ODA received by a country "NDD weight" = NDD ODA/Total ODA[7]

- the evolution of emerging donors weight in total ODA[8].

Because of China's high profile in Africa, much of the discussion about new donors has centered on China's role in development cooperation, and the differences between its approach to development cooperation and the DAC principles. We use the ratio between China GDP and World GDP as proxy for the perception of the influence of emerging countries in the global economy and in development assistance.As an alternative strategy, we make the instrumentation of the NDD ODA share of total ODA with the ratio of China GDP to World GDP. Another reason to use instrumentation, it is that data on emerging donors aid allocation are incomplete because some important non-DAC donors clearly resent the traditional dominance of the DAC. China and India, in particular, frame their financial, economic and technical support to other emerging and developing countries as South-South cooperation. They do not want to be perceived as aid donors but rather as partners.

[7] In practice the ratio of Non-DAC donor aid disbursements and net aid received by a recipient.

[8] "NDD evolution"= Δ(NDD ODA/(NDD ODA + DAC ODA)).

Moreover,they are reluctant to closely coordinate their aid activities with other donors if doing so compromises their policy autonomy. So in our paper we intentionally regroup non-DAC as countries that "are blamed for undermining DAC efforts at better governance and policy reforms in the recipient countries, thereby decreasing the effectiveness of their aid" and "could undermine the lead-donor advantages". Thus, we emphasize on the perception that DAC donors have of these new donors to justify our instrumentation strategy given the data limitation.

The other explanatory variables can be categorized into two groups, relative to recipients and donors:*Need-Merit and Donor self-interest*.

Recipient needsand Merit

Guillaumont (2008) proposes a normative analysis of aid allocation. He argues that two main categories of factors relating to the effectiveness of aid have emerged from the debate in the last decade. The first category is policy, institutions and governance (which has been often investigated in the literature since Burnside & Dollar, 2000). The second category is related to exogeneous shocks and structural economic vulnerability. In this second category the idea is that, other things being equal, aid works better in a good policy environment and aid is likely to dampen the negative effects of shocks on growth, to lower the relative shortfall of resources, and to prevent economic collapse (Guillaumont & Chauvet, 2001).

If we can consider both structural economic vulnerability and the quality of policy as significant factors in aid effectiveness, then we should consider them also as relevant criteria for aid allocation. Guillaumont (2008) also discusses the goals of development cooperation,

relating international justice to the compensation of countries' structural handicaps[9] to growth and poverty reduction.

We capture recipient needs by three variables: income per capita, human capital (measured by the Human Assets Index, HAI), and structural vulnerability (measured by the Economic Vulnerability Index, EVI). The levels of (100-HAI) and EVI, two composite indices, are assumed to reflect the main structural handicaps faced by the country (United Nations 2008, Guillaumont 2008).

The "merit" variables analyze whether donors pay attention to the quality of policy when they allocate aid. Following Berthélemy & Tichit (2004), we proxy economic performance by the growth of GDP per capita, and the flow of FDI received. However, donors could interpret low growth as an indicator of high need, and high amounts of FDI as an indicator of low need. Following Younas (2008), we also proxy recipient merit with democracy and human rights. For the human rights measure, we have used the indices for political rights and civil liberties[10] produced by Freedom House (2005).

Donor self-interest

To control for commercial interests we use openness to trade[11] and total imports as ratios to GDP. The trade variable is included as an indicator of how donors' commercial interests influence aid allocation, reflecting the level of trade openness of recipient countries (exports

[9]Structural handicaps are those, which are durable, and beyond the present capability of the country (of course they may result from past policy): they mainly reflect the impact of historical or geographical factors, as well as that of the international environment.

[10]Political rights refer to the freedom of people to participate in the political process by exercising their voting right, being able to organize political parties to compete for public office, and forming an effective opposition and electing representatives who devise public policies and are accountable for their actions. Civil liberties entail freedom of expression and religious belief, the prevalence of rule of law, right to form unions, freedom to marry, and freedom to travel. It also signifies the autonomy of people without interference from the state. These two indicators are derived from a cross-country survey every year. Each of these indices is measured on a 1 (best) to 7 (worst) points scale.

[11]We do not use bilateral trade flow because there might be a simultaneity bias when aid is tied, because more tied aid will imply more imports from the donor.

and imports). Aid may be given as a reward for promoting imports and following policies to liberalize trade (Younas, 2008). We also control for special linkages between donors and recipients; previous studies having found that donors give more aid to their past colonies (Alesina & Dollar, 2000; Neumayer, 2003). We use a dummy variable equal to 1 when the recipient is a former colony of any donor in our study, and 0 otherwise.

Additional controls

We include a measure of the population of the recipient country and the average distance to OECD economies. In the bilateral model, we control for multilateral aid provided to the recipient[12] as an indicator of policy coherence in aid allocation.

We also include a lagged dependent variable to capture the possible allocative inertia in the aid allocation process. In practice, donor agencies are reluctant to variations in aid flows, especially downwards, given the administrative and political involvement with recipient countries. One would expect, therefore, relatively smooth aid flows over time. The coefficient attached to the lagged aid variable can be either positive or negative, respectively indicating a gradual increase or decrease in aid over time (Feeny & McGillivray, 2008).

4.3.2. Data description

There are two samples of aid data: Multilateral data and bilateral data.

Our dataset covers 157 recipient countries, and multilateral aid from DAC and G7 donors bilateral aid allocations over the period 1980 to 2010. The coverage of our data is limited by the availability of information about aid from emerging donors. We deal here with a three-dimensional (year / donor / recipient) panel database, of almost 33,000 observations. The data

[12]Berthélemy & Tichit (2004) used a similar strategy to test whether a donor takes note of aid allocations decided by other donors.

on aid comes from the OECD online statistics database, which provides data on DAC donor aid flows.

At present, 20 countries beyond the DAC membership report their aid flows to the DAC: Republic of China (Taiwan), Cyprus, Czech Republic, Estonia, Hungary, Iceland, Israel, Kuwait, Latvia, Liechtenstein, Lithuania, Malta, Poland, Romania, Saudi Arabia, Slovak Republic, Slovenia, Thailand, Turkey and United Arab Emirates. The overall non-DAC aid dataare estimated by the OECD based on various sources, notably data published by major non□DAC donors: China, India, Brazil, the Russian Federation and South Africa. In 2010, the PLAID (Project-level Aid) and Development Gateway generated AidData. AidData is designed to address some of the limitations of the OECD-CRS dataset. A major advantage of AidData is that it includes more data from non-DAC donors. Data were collected from various sources, such as annual reports, media reports, public websites or the statistical agencies of the donors. Although the efforts made by AidData to expand the availability of aid data, these approaches have led to a less standardized data collection process across donors than is used by the OECD-CRS, and may generate some mistakes in data. As example, the last AidData project "China-Africa aid database" (released in April 2013) supposed to compile all Chinese development finance to Africa from 2001 to 2011 using a media-based data collection methodology, raised a huge debate about the reliability of these data. Deborah Brautigam (The Brookings Institution) detailed the limits of the AidData project and warned researchers to wait around to have someone clean the data before using them and setting numbers into stone. Thus, we prefer at this stage use OECD database.

In appendix, we provide a table presenting gross concessional flows for development co-operation from non-DAC donors reported to DAC in the 2000's to illustrate the data limitation faced by our analysis.

Following Berthélemy & Tichit (2004), we use aid commitments rather than disbursements, because this variable better reflects the donor decisions. Donors have total control of the commitments, whereas disbursements depend in part on the recipients' willingness and administrative capacity to get the money. Another important issue is the common use of "per capita aid" as a dependent variable in aid allocation models. Feeny & McGillivray (2008) argue that if the main object of a model of aid allocation is to explain observed aid allocations, then the specification or measurement of the aid variable must ultimately rest on the most likely decision variable used in practice by donor agencies. Aid administrators rarely speak of per capita aid, the focus is on absolute aid amounts.Then we should use aid per capita and aid in level alternatively as endogenous variable, but here we opt for the per capita commitments as they allow us to test previous findings like the "small country bias", the bandwagon effect or aid inertia among others.

4.4.Results

Following the existing literature, we provide estimations based on three different approaches: Random-effects Tobit, Dynamic POLS and Generalized method of moments (GMM)[13][14].

4.4.1. Determinants of aid allocation

Before turningto the variable in which we are interested, we wanted tocheck the conformity ofour resultswith the patterns ofaid allocationidentifiedin previous studies.

[13]Because there can be important dynamics in aid determination, most regressions include a lagged dependent variable and estimate the coefficients as a dynamic panel using the general method of moments (GMM). For example, because of inertia in the adjustment of aid policies, aid flows in a given period may relate to those in previous periods, even though country policies and other circumstances have changed. In addition, aid projects may involve lumpy disbursements, leading to autocorrelation Claessens et al (2009).

[14]Following Dreher et al (2011) we do not use the Heckman selection model because we lack a meaningful exclusion restriction.

Table 1 (columns 1-6) and Table 2 (columns 1-2) therefore present estimates run with thetraditionalspecificationin which*income level*and*population size*capture theneeds ofrecipient countries, *GDP growth rate* is a proxy foreconomic performance,*the civil rights and political institution environment* is a proxy formerit, and *trade openness*measures thestrategiccomponentof aid allocation (as detailedin the theoretical framework). In addition, we also include the allocation of multilateral ODA (other thanDAC)in order to identify Dudley &Montmarquette's (1976)′ *bandwagon effect* in aid allocation. This theory, recently tested by Feeny & McGillivray (2008) and Harrigan & Wang (2011), expresses the idea that when a recipient receives an increase in aid from one donor it may attract more from other donors as well. Allocation inertia is also a debate here.

On average, most results (on multilateral and bilateral DAC aid data), are in line with the expectations.

Lagged growth has the expected positive sign; however in the bilateral specification, the impact loses significance and in some cases the values shift. This result means that donors reward recipients which have a good policy environment, but at the same time some donors may interpret high growth as less need of aid. Then DAC multilateral aid allocation responds to merit while individual donors may have different definitions of a recipient country's needs. If DAC multilateralallocationis done torewardcountries which aremakingthe most effortin terms ofeconomic performance, at the bilateral level other factors prevail.

The results show negative coefficients on the institutional variable, implying that countries with bad institutions receive, other things being equal, less aid from DAC members. Its significance varies a little across the specifications, but on average, there is clear empirical evidence.

The coefficients for income and population indexes[15] have a positive and statistically significant sign, suggesting that donors (multilateral and bilateral DAC allocation) respond to recipient needs (they assume that level of income gives a measure of need), and also indicating a bias against larger countries. The "smaller country bias" is related to two complementary explanations:- for big countries there are bottlenecks in their technical and administrative capacity to absorb additional amounts of aid, and donors perceive a diminishing marginal impact of aid as the population of a recipient increases (Dowling & Hiemenz, 1985).

Two variables describe internal features of aid allocation: lagged aid and multilateral aid allocation of global ODA. The analysis of the coefficient for the lagged dependent variable shows evidence of aid allocation inertia. Allocative inertia reflects bureaucratic expedience between countries. The positive and significant coefficient for the lagged DAC aid variable shows that allocative inertia has allowed the amount of aid from DAC donors to increase over time. We also demonstrate the "*bandwagon effect*" with a positive parameter on multilateral ODA.

Trade openness has a strong and significantly positive impact on aid allocation. Younas (2008) describes empirically the trade motive behind aid allocation as a reward to the recipient nations for promoting imports of goods, and removing trade restrictions. He concludes that bilateral aid from DAC countries is disproportionately allocated to those recipient nations which have a greater tendency to import goods from donor countries. These findings focus on aid as an important strategic tool, and it is on this non-altruistic side of aid allocation that we want to present new evidence through an assessment of the unseen

[15]We use standardized variables of population and income per capita in order to express needs, thus it reverses the interpretation of coefficients estimates.

competition taking place in development cooperation between DAC donors and emerging donors

4.4.2. Results on multilateral DAC aid allocation

Though our preliminary results largely support previous findings about aid allocation, we now include variables which measure the influence of emerging donors on development aid, in order to assess the policy of the DAC group in dealing with the increasing NDD ODA in recipient countries.

- *Average DAC multilateral reaction*

First, we include a variable capturing the "weight of NDDs in ODA" in equation (8). With annual data, the coefficients for "NDDs' influence" have a negative and significant sign in a range of -0.04 to -0.03 for the Random Effects-Tobit; between -0.033 and -0.032 for the Dynamic POLS; and around -0.06 for the Blundell Bond GMM estimator (Tables 1,2,3). These results suggest that the more a recipient country receives aid from NDDs the less it receives multilateral aid from the DAC group. Thus, it seems that NDD aid and DAC multilateral aid are substitutes. The DAC group reduces the amount of multilateral aid allocated to a country in response to an increase of NDD aid. This is done in order to reallocate aid to others which have a needs-based objective, or to punish countries that have welcomed these new donors.

Columns 4 and 9 in Table 1, present results for the second variable which captures the perception of the influence of emerging donors in development cooperation by DAC members. The findings are similar and still robust to estimation methods, but with different amplitude.

To test the robustness of the results, we include additional control variables which are expected to have an influence on DAC aid allocation because they capture other dimensions of recipient needs and linkages with donors. Therefore, we add four variables into the previous regressions: log of foreign direct investment per capita (economic performance), log of (100-Hai) and log of EVI (handicaps to growth), and a colonial past dummy (special links between donors and recipients). The inclusion of these controls brings us to the same conclusion (see Table 1: columns 5&10 and Table 3).

We also consider the estimation results when taking 3-year averages of the data to reduce the effect of aid volatility. The estimation results are in Table 2 (Columns 5&6 and 9&10). The coefficients for the variables which capture the NDDs influence on development aid are still negative and statistically significant, thus confirming our previous conclusions about substitution between NDD aid and multilateral DAC aid[16].

- *Test of common behaviour in the face of NDD influence*

In Section 1 (description of theoretical framework), we saw that all countries do not have the same value in the eyes of donors, because of various reasons related to economic and political interests as well as common histories. So the coefficients for needs, merit and self-interest variables should vary across recipients in the model. However,the reactionof the DAC groupto the influence of emerging donors should be common to every country in which the NDDs are present. To identifythe nature of the DAC group's behaviour as a reaction to the influence of NDDs, in comparison tothe other variablesinfluencingthe DAC aid allocation, we use the Augmented Mean Group estimator (AMG) developed by Eberhardt & Teal (2011).The AMG estimator is an extension of the Pesaran (2006) Common correlated effects Mean Group estimator (CCEMG) which allows for heterogeneous slope coefficients across

[16]We do not comment on some variations appearing in aid allocation determinants because it is not the aim of the paper. Berthelemy & Tichit (2004) and Claessens et al (2009) provided detailed description of the changing value of the factors determining aid allocation over time.

countries in panels, cross-section dependence (due to common shocks or spillovers effects), and time-variant unobservables[17]. Table 4 shows the results of this procedure. There is evidence of a common dynamic process in the multilateral reaction of DAC towards recipients. The coefficients for the other explanatory variables are not significant, and confirm that all recipients do not have the same value for donors. In fact, the non-significance of coefficients in this estimation procedure proves that donors treat recipients differently; on the other hand, DAC donors agree, at least at the multilateral level, on a common way to deal with the increasing influence of emerging donors.

4.4.3. Results on DAC members bilateral aid allocation

The aim of this sub-section is to distinguish behaviour common to the DAC group from individual donors' behaviour in dealing with the emergence of NDDs. In this vein, we estimate the model based on equation (9/10) with bilateral data. Table 5 describes the allocation decisions of the seven major DAC countries for the period 1980-2010, and their strategic choices in dealing with the emergence of NDDs in development cooperation.

The usual findings about the aid allocation process are seen: "bandwagon effect", importance of commercial and economic linkages, colonial past, and allocative inertia. Furthermore, the results suggest that donors have responded, somehow, to good policy environments and recipient needs, even if they can do better. Harrigan & Wang (2011) show that bilateral donors put less emphasis on good policy environments and recipient needs than multilateral donors, and that the largest donors allocate a low proportion of their aid on a needs/merit basis. Our results confirm this conclusion, as well as the deterioration in allocation motives; we find that countries with high structural handicaps tend to receive less bilateral aid.

[17]See Eberhardt & Teal (2011).

The coefficients for the variables measuring NDD power in official development assistance in Table 5 are positive and statistically significant, suggesting that when NDDs increase their ODA to a country, the major DAC donors (on average) also increase their ODA to this recipient. This behaviour contrasts with the evolution of DAC multilateral allocation described above. However, it is not surprising to observe this finding because the bilateral aid allocation decision-making groups of donor aid agencies have as objective to preserve their commercial, political, and strategic self-interests. Thus, DAC donor agencies react so as to maintain their "lead donorship" in recipient countries, because as suggested by Steinwand (2010), they benefit from this position. This result is very important because we are empirically describing the competition between DAC donors and emerging donors in development cooperation.

- *Identification of common behaviour in G7 members' aid allocation*

We again use the AMG estimator procedure to identify common dynamic processes in the bilateral aid allocation of the major DAC donors. The results are reported in Table 6 and suggest that every donor follows its own strategy, due to the different interests and the different recipient countries concerned. There is a heterogeneous management of aid allocation; however, we demonstrate a common "bandwagon effect" in bilateral aid allocation decisions.

- *Individual aid allocation: Different donors and Heterogeneous behaviours*

Although the impact of NDD influence is significantly positive for most G7 donor aid allocation, the importance may vary among donors. Table 7 presents the results of regressions using equation (11), and Table 8 explores the distinct aid allocation behaviours of DAC

donors rather than lumping them together in one regression. We note that donors, on average, increase their aid allocation to maintain their leadership, although the significance of the coefficient varies due to estimation methods and lack of observations, when performing individual aid allocation regression.

Concerning the other explanatory variables, our results are similar to Berthelèmy & Tichit (2004) and others. For civil liberties and political rights, we have negative parameters for most of the donors, meaning that, all things being equal, bad governments receive less aid. The coefficients are statistically significant only for Canada, Japan, United States and United Kingdom[18]. According to our estimates, France goes in the other direction, with positive coefficients, because France tends to give large amounts of aid to some of its former colonies, which are African countries with weak institutions.

The analysis of economic performance variables gives mixed results. Few donors have significantly positive parameters for either FDI or lagged growth, or both. The most robust result across specification is a significantly positive coefficient of the United Kingdom for FDI. It seems that some donors like the United Kingdom may also consider investment attractiveness in their aid allocation.

4.4.4. Sensitivity Analysis: Spurious regressions or genuine effect

We commonly use correlated data, so we need to be sure that the estimated effect is not spurious. Because high correlation among regressors may lead to imprecise regressions, we use two tools suggested by Besley (1991) and Chatelain & Ralf (2012) to limit the risk of misleading findings : *a collinearity diagnostic[19] using variance inflation factor and condition index (before regression) , and the parameter inflation factor (after regression).*

[18]We are commenting here on the Tobit, Dynamic BB GMM and POLS results in Tables 7 and 8.

[19]The appendix provides statistics describing the data and collinearity diagnostics results. Besley et al (1980) suggest that if the condition index is large ie. 30 or higher then there may be collinearity problems.

Chatelain & Ralf (2012) propose a simple method to detect spurious regressions, using what they call the "parameter inflation factor" (PIF) to evaluate the level of imprecision in our results. The PIF is a measure of the relative omitted variable bias in a simple regression in proportional terms, with respect to a multiple regression (Chatelain & Ralf, 2012).

Consider the following equations:

$$x_1 = \beta_{1.2} x_2 + \beta_{1.3} x_3 + \cdots + \beta_{1.k} x_k \qquad (M)$$
$$x_1 = \beta_{1.2} x_2 \qquad (S)$$

then,

$$PIF_2 = \frac{\left[1 - \frac{r_{13}}{r_{12}} r_{23}\right]}{VIF}, for \qquad k = 2$$

where VIF is the variance inflation factor, $r_{1.j}$correlations coefficients with the dependent variable, and r_{ij}correlations coefficients of the regressors (i,j>1 and i#j). PIF is equal to the ratio of the multiple regression parameter $\beta_{1.2(m)}$ and the parameter of the simple regression $\beta_{1.2(s)}$[20],or the ratio of the multiple correlation standardized parameter β_{12} and the correlation coefficient $r_{1.2}$.

In practice, to judge the plausibility of the size of the parameter, a simple rule is that when **PIF is above 2** it may be evidence of a potential spurious regression.

Table 12 presents PIF results for the ordinary least squares estimated parameters. The PIF show that our findings about strategic interactions between donors are not due to misleading regressions. We also performed PIF calculations with standardized variables and the results remain the same.

Table 12: Detecting spurious regressions

Data used	NDD weight		NDD (standardized data)		PIF	Spurious
	Multi	Simple	Multi	Simple		
Multilateral data						
-annual	-0.0325	-0.0846			0.38	No
			-0.09	-0.123	0.75	No
-3-year average	-0.047	-0.107			0.439	No
Bilateral data	0.0086	0.0089			0.963	No

[20]The idea behind this notion is the same as Altonji et al's (2005) ratios to assess unobservables selection bias.

4.5.Discussion Aid allocation more or less need-oriented?[21]

One important conclusion of aid allocation literature is that donor self-interest is an important determinant in the allocation of development aid. We tried to describe through this analysis the behaviours followed by donors to preserve their leadership in development assistance. According to our estimates, DAC members tend to increase their bilateral aid to countries welcoming emerging donors while it seems that the DAC multilateral aid policy goes in the other direction. This strategy aims to help traditional donors to preserve their individual political and economic interests in recipients. The reaction to an increase in non-DAC aid may be different if DAC and non-DAC donors perceive each other as partners with coordinated aid activities rather than competitors. Given the political nature of development cooperation, there are clear limits to cooperation involving emerging donor countries such as China or India and traditional donors. None of the parties involved has sufficiently strong incentives to overcome this situation.

Recipient countries could exploit the competition between traditional and emerging donors by maximizing overall aid inflows; or they may use their bargaining position to regain policy space after decades of conditionality from "Western donors".However, the available evidence on non-DAC aid effectiveness is limited and largely based on the common argument that some non-DAC donors have their own recent development experience to offer on how to put foreign aid, in combination with local resources, and could provide important lessons to recipient countries. But given the absence of consensus on the conditions under which aid may be effective, this competition between traditional and emerging donors could undermine the quality of aid.

Throughout our analysis, we have observed that the criteria used by donors do not precisely reflect the needs of countries, some issues like economic vulnerability and low human capital

[21]Including also merit-based decisions.

are rarely taken into account. Therefore, to assess the quality of aid (from a recipient perspective) we now focus on the orientation of aid towards needs.

Here we briefly analyze the impactof competition between DAC donors and non-DAC donors onthe quality of aid allocation. Table 9 reports the estimations based on regressions of interacting variables measuring NDD influence with needs and merit variables. The instrumentation confirms our baseline estimates (Tables 10 and 11).

For bilateral aid, we notice an improvement in aid allocation criteria as countries with severe handicaps in terms of capability and human capital receive ever more assistance (last three columns of Table 9). Thus, it seems that the competition between donors leads to a more need-oriented aid allocation. DAC Donors tend to specialize their aid policies and they do so by targeting sectors where they have comparative advantages, notably human and social development.

The results related to multilateral aid tend to confirm our doubts about a 'positive' substitution or a 'sanction' for NDD friends. In fact, it would be logical that aid would go to countries that need it most, if DAC multilateral aid and NDD aid were substitutable. Unfortunately, the results do not point to that conclusion, and in fact show that a reduction of aid allocation, in reaction to recipient behaviour toward emerging countries, leads to a deterioration ofthe orientation of theaid allocation decisions ofDAC donors. Indeed, the coefficients forthe interaction termsinTable 9 (first three columns) showthat they not only take less account of the structural handicaps ofcountries, but alsothey are less concerned with the institutional quality of the country. Everything operates as if the DAC donors were adjusting to the criteria used by emerging donors to preserve DAC lead donorship, and we end up with the level of per capita income and population size as the only criteria for aid allocation.

4.6. Conclusion

Debate about the impact of “emerging donors” is becoming increasingly heated because some developing countries do not simply consider emerging donors as another source of development finance, but rather as powerful alternatives that might lead to new ways of understanding development. Even if it remains difficult to weigh up the opportunities and risks brought by non□DAC donors, the increasing activity of emerging donors has generated hostile opinions because some people think that they represent a threat to healthy and sustainable development. Indeed, the increased complexity of the donor community at the recipient level may lead to unsustainable levels of debt and unproductive capital investment. Although concerns about governance standards and public management systems in recipient countries are relevant, the importance of political and strategic interests behind development cooperation certainly influences this debate.

We analyzed the multilateral and bilateral reactions of DAC members in face of the emergence of new donors in development assistance. We find that countries where emerging donors have a big influence, receive less multilateral aid from DAC members, as if DAC multilateral aid were substituted by ODA from emerging donors. However, the bilateral aid allocation model shows that DAC donors increase their ODA to maintain their "lead donorship" in recipient countries, and so preserve their commercial, political, and strategic self-interests.

The results we have obtained also conclude that competition between donors could affect the quality of DAC aid allocation by changing its orientation relative to the need and merit of recipients. In the bilateral case, there is an improvement in aid allocation criteria, as countries with severe handicaps in terms of capability and human capital receive ever more assistance. In contrast, the emergence of non-DAC actors could lead to a deterioration in the orientation of multilateral aid allocation decisions.

Our findings suggest that the relation between DAC and emerging donors, in its current form, can be detrimental for recipient countries. In order to protect their own interests DAC donors modify their aid allocation, which ultimately affects the quality of their aid allocation and aid effectiveness. Future research should focus more on this issue in order to better understand the implications for recipient countries, and then recommend policy measures to protect their interests.

Results

Table 1: Multilateral aid allocation /Annual data

	Random Effect- TOBIT					POLS				
Independent variables	1	2	3	4	5	6	7	8	9	10
Non-DAC evolution				***-0.09 (0.00)***	***-0.06 (0.00)***				***-0.04 (0.00)***	***-0.05 (0.00)***
Non-DAC weight		***-0.03 (0.00)***	***-0.04 (0.00)***				***-0.032 (0.00)***	***-0.033 (0.00)***		
Aid (t-1)						**0.80 (0.00)**	**0.78 (0.00)**	**0.75 (0.00)**	**0.76 (0.00)**	**0.75 (0.00)**
Popindex	**0.036 (0.00)**	**0.037 (0.00)**	**0.021 (0.00)**	**0.038 (0.00)**	0.023 (0.00)	**0.005 (0.00)**	**0.005 (0.00)**	**0.004 (0.00)**	**0.006 (0.00)**	**0.005 (0.02)**
Gniindex	**0.004 (0.00)**	**0.002 (0.14)**	**-0.004 (0.04)**	0.001 (0.64)	**-0.004 (0.09)**	**0.003 (0.00)**	**0.0016 (0.04)**	**0.0037 (0.00)**	**0.0017 (0.03)**	**0.003 (0.00)**
(100-Hai)			**0.014 (0.00)**		**0.014 (0.00)**			**-0.002 (0.01)**		**-0.0024 (0.02)**
EVI			**0.009 (0.00)**		**0.01 (0.00)**			-0.001 (0.36)		-0.0023 (0.24)
Political and civil rights	**-0.045 (0.00)**	-0.01 (0.41)	-0.01 (0.30)	-0.004 (0.74)	-0.012 (0.41)	**-0.013 (0.02)**	-0.007 (0.29)	0.002 (0.75)	-0.002 (0.74)	0.005 (0.50)
Multilateral aid pc	**0.24 (0.00)**	**0.18 (0.00)**	**0.075 (0.05)**	**0.18 (0.00)**	**0.23 (0.00)**	**0.07 (0.00)**	**0.09 (0.00)**	**0.13 (0.00)**	**0.096 (0.00)**	**0.14 (0.00)**
Openness/GDP	**0.17 (0.04)**	**0.16 (0.00)**	**0.29 (0.00)**	**0.15 (0.00)**	**0.29 (0.00)**	**0.04 (0.08)**	**0.069 (0.00)**	**0.06 (0.07)**	**0.09 (0.00)**	**0.062 (0.06)**
GDP pc growth	**0.003 (0.08)**	0.0007 (0.73)	-0.001 (0.78)	**0.005 (0.02)**	-0.0001 (0.95)	-0.002 (0.22)	-0.000 (0.98)	0.001 (0.81)	-0.001 (0.51)	0.001 (0.72)
FDI/GDP			0.001 (0.94)		0.001 (0.94)			0.006 (0.43)		0.006 (0.46)
Ex-colony dummy			0.021 (0.93)		0.010 (0.96)			-0.008 (0.89)		-0.02 (0.76)
Intercept	-0.02 (0.93)	**-0.26 (0.39)**	-0.63 (0.13)	-0.34 (0.25)	**-0.87 (0.04)**	-0.09 (0.43)	-0.17 (0.22)	-0.63 (0.13)	**-0.36 (0.01)**	-0.04 (0.82)
R^2						0.870	0.874	0.868	0.872	0.872
Observations	2912	1866	1462	1921	1469	2886	1851	1488	1905	1496
Censored	109	57	45	61	45					
Rho	0.55	0.63	0.59	0.63	0.57					
Group	123	120	109	123	109	123	120	109	123	109

Random-effects Tobit model (random-effect time_donor_recipient); Rho = standard deviation of the random effects/standard deviation of residual; p-value clustered by country in brackets.

Dynamic POLS Estimated with heteroscedasticity-robust standard errors. Year dummies included but not reported; p-value clustered by country (or donor_recipient) in brackets.

Table 2: Multilateral aid allocation/3 year average

	Tobit						POLS			
Independent variables	1	2	3	4	5	6	7	8	9	10
Non-DAC evolution					**-0.07 (0.00)**	**-0.067 (0.00)**			**-0.067 (0.00)**	**-0.067 (0.00)**
Non-DAC weight			**-0.047 (0.00)**	**-0.044 (0.00)**			**-0.047 (0.00)**	**-0.043 (0.00)**		
Aid (t-1)	**0.58 (0.00)**		**0.57 (0.00)**	**0.66 (0.00)**	**0.55 (0.00)**	**0.69 (0.00)**	**0.68 (0.00)**	**0.69 (0.00)**	**0.64 (0.00)**	**0.70 (0.00)**
Popindex	**0.01 (0.00)**	**0.028 (0.00)**	**0.011 (0.00)**	-0.003 (0.40)	**0.012 (0.00)**	-0.002 (0.58)	0.005 (0.32)	-0.004 (0.26)	0.006 (0.26)	-0.003 (0.36)
Gniindex	**0.004 (0.00)**	**0.005 (0.00)**	**0.003 (0.04)**	-0.001 (0.41)	**0.003 (0.03)**	-0.001 (0.45)	**0.002 (0.08)**	0.002 (0.35)	0.002 (0.11)	0.001 (0.53)
(100-Hai)				0.003 (0.13)		0.002 (0.18)		-0.002 (0.26)		-0.001 (0.45)
EVI				**0.006 (0.06)**		0.004 (0.13)		0.003 (0.17)		0.003 (0.17)
Political civil rights	-0.01 (0.39)	**-0.038 (0.03)**	0.002 (0.86)	0.003 (0.81)	0.01 (0.48)	0.007 (0.52)	-0.008 (0.50)	0.003 (0.80)	-0.003 (0.78)	0.006 (0.61)
Multilateral aid pc	**0.19 (0.00)**	**0.37 (0.00)**	**0.17 (0.00)**	**0.20 (0.00)**	**0.19 (0.00)**	**0.20 (0.00)**	**0.16 (0.00)**	**0.23 (0.00)**	**0.20 (0.00)**	**0.23 (0.00)**
Openness /GDP	**0.06 (0.10)**	**0.19 (0.00)**	**0.10 (0.03)**	**0.24 (0.00)**	**0.11 (0.02)**	**0.20 (0.00)**	**0.12 (0.00)**	**0.17 (0.01)**	**0.13 (0.00)**	**0.14 (0.02)**
GDP pc growth	0.005 (0.17)	**0.016 (0.00)**	**0.013 (0.00)**	**0.019 (0.00)**	**0.01 (0.02)**	0.02 (0.00)	**0.013 (0.00)**	**0.016 (0.02)**	**0.010 (0.08)**	**0.017 (0.02)**
FDI/GDP				**-0.046 (0.00)**		**-0.04 (0.00)**		-0.007 (0.69)		0.0001 (0.99)
Ex-colony dummy				-0.03 (0.71)		-0.06 (0.43)		-0.15 (0.16)		-0.18 (0.10)
Intercept	-0.0005 (0.99)	-0.09 (0.78)	-0.38 (0.11)	**-0.71 (0.01)**	**-0.56 (0.02)**	**-0.68 (0.01)**	**-0.42 (0.06)**	-0.29 (0.26)	-0.14 (0.55)	-0.33 (0.19)
R^2							0.858	0.876	0.846	0.874
Observations	974	1078	709	600	723	599	706	599	723	598
Censored	31	40	20	16	23	18				
Rho	0.16	0.50	0.22	0.07	0.20	0.008				
Group	123	123	119	107	123	108	119	107	123	108

Random-effects Tobit model (random-effect time_donor_recipient); Rho = standard deviation of the random effects/standard deviation of residual; p-value clustered by country in brackets.

Dynamic POLS Estimated with heteroscedasticity-robust standard errors. Year dummies included but not reported; p-value clustered by country (or donor_recipient) in brackets.

Table 3: Multilateral aid allocation (Dynamic Specification)

	Annual						3-year average					
Independent variables	POLS	TOBIT	GMM	POLS	TOBIT	GMM	TOBIT	POLS	GMM	POLS	TOBIT	GMM
Non-DAC evolution				*0.003* *(0.59)*	***-0.06*** ***(0.00)***	***-0.09*** ***(0.00)***				***-0.08*** ***(0.00)***	***-0.085*** ***(0.00)***	***-0.054*** ***(0.04)***
Non-DAC weight	*-0.003* *(0.96)*	***-0.04*** ***(0.00)***	***-0.07*** ***(0.02)***				***-0.04*** ***(0.00)***	***-0.04*** ***(0.05)***	***-0.044*** ***(0.05)***			
Popindex	0.002 (0.30)	**0.021** **(0.00)**	0.001 (0.88)	0.002 (0.28)	**0.023** **(0.00)**	0.003 (0.75)	**0.019** **(0.00)**	**0.017** **(0.01)**	**-0.023** **(0.03)**	**0.18** **(0.00)**	**0.021** **(0.00)**	**-0.023** **(0.06)**
Gniindex	**0.004** **(0.00)**	**-0.004** **(0.038)**	-0.004 (0.67)	**0.004** **(0.00)**	**-0.004** **(0.07)**	-0.006 (0.52)	-0.005 (0.11)	**0.01** **(0.02)**	-0.007 (0.33)	**0.008** **(0.05)**	-0.005 (0.10)	-0.007 (0.33)
(100-Hai)	**-0.002** **(0.01)**	**0.014** **(0.00)**	0.003 (0.61)	**-0.002** **(0.02)**	**0.014** **(0.00)**	0.006 (0.49)	**0.014** **(0.00)**	-0.003 (0.38)	0.0004 (0.94)	-0.002 (0.63)	**0.015** **(0.00)**	0.0004 (0.94)
EVI	0.000 (0.97)	**0.009** **(0.00)**	-0.001 (0.90)	0.0002 (0.88)	**0.010** **(0.00)**	-0.006 (0.63)	0.005 (0.23)	-0.005 (0.42)	0.015 (0.10)	-0.005 (0.40)	0.005 (0.248)	0.16 (0.11)
Political and civil rights	-0.007 (0.92)	-0.016 (0.29)	0.024 (0.47)	-0.003 (0.99)	-0.012 (0.41)	0.04 (0.34)	-0.007 (0.71)	0.006 (0.81)	-0.04 (0.32)	0.007 (0.78)	-0.007 (0.73)	-0.05 (0.38)
Multilateral aid pc	**0.12** **(0.00)**	**0.24** **(0.00)**	**0.075** **(0.05)**	**0.12** **(0.00)**	**0.23** **(0.00)**	**0.080** **(0.05)**	**0.33** **(0.00)**	**0.54** **(0.00)**	**0.27** **(0.00)**	**0.54** **(0.00)**	**0.323** **(0.00)**	**0.28** **(0.00)**
Openness /GDP	**0.073** **(0.04)**	**0.29** **(0.00)**	0.247 (0.16)	**0.068** **(0.059)**	**0.30** **(0.00)**	**0.32** **(0.08)**	**0.39** **(0.00)**	**0.28** **(0.03)**	0.31 (0.28)	**0.30** **(0.02)**	**0.38** **(0.00)**	0.21 (0.46)
GDP pc growth	0.0003 (0.89)	-0.002 (0.54)	0.002 (0.77)	0.0003 (0.90)	-0.001 (0.67)	0.000 (0.89)	**0.012** **(0.05)**	-0.001 (0.93)	0.01 (0.18)	0.002 (0.85)	**0.014** **(0.03)**	0.011 (0.15)
FDI/GDP	0.0005 (0.94)	0.001 (0.92)	0.19 (0.15)	0.003 (0.70)	0.001 (0.92)	**0.24** **(0.09)**	-0.017 (0.40)	**-0.05** **(0.08)**	-0.056 (0.12)	**-0.059** **(0.06)**	-0.03 (0.20)	-0.06 (0.10)
Ex-colony dummy	0.0001 (0.99)	0.019 (0.93)	0.007 (0.97)	-0.000 (0.99)	0.008 (0.97)	-0.02 (0.94)	0.047 (0.84)	0.064 (0.74)	-0.093 (0.51)	0.047 (0.81)	0.024 (0.91)	-0.079 (0.64)
Intercept	-0.009 (0.95)	-0.63 (0.13)	-0.34 (0.67)	0.026 (0.86)	-0.86 (0.03)	-0.43 (0.62)	**-1.00** **(0.04)**	-0.35 (0.56)	-0.008 (0.99)	-0.55 (0.34)	**-1.26** **(0.01)**	0.379 (0.72)
R^2	0.865			0.863				0.667		0.670		
Observations	1454	1462	1488	1460	1469	1496	640	560	599	559	639	598
Censored		45			45		20				22	
Rho		0.59			0.57		0.64				0.59	
Hansen			0.36			0.14			0.16			0.18
AR(2)			0.70			0.25			0.11			0.20
Instruments			59			59			45			45
Group	109	109	109		109	109	108	106	107	106	108	108

Random-effects Tobit model (random-effect time_donor_recipient); Rho = standard deviation of the random effects/standard deviation of residual; p-value clustered by country in brackets.

Dynamic POLS Estimated with heteroscedasticity-robust standard errors. Year dummies included but not reported; p-value clustered by country (or donor_recipient) in brackets.

Dynamic GMM Blundell and Bond (1998); only lagged variables' estimates are reported. Instruments= Ratio of China and World GDP (proxy of perception of Emerging countries influence on global economy), Average Distance to OECD countries, Language, other measures of economic policies performance and internal instruments.

Table 4: Donors'common behaviors (DAC Multi ODA)

Variables	Ln(aidpc)	Ln(aidpc)
NDD influence	**-0.09 (0.00)**	**-0.05 (0.00)**
POP (index)		**0.36 (0.01)**
GNI (index)		0.058 (0.80)
TRADE		0.195 (0.30)
Multi AID		0.072 (0.43)
Political and civil rights		-0.069 (0.40)
Growth		-0.001 (0.83)
FDI		0.028 (0.60)
Common dynamic factor	**0.85 (0.00)**	**0.91 (0.00)**
Chi2 (prob)	**0.00**	**0.00**
Countries	126	87

All coefficients represent averages across groups.

Table 6: Donors'common behaviors (G7 donors bilateral aid)

Variables	Ln(aidpc)	Ln(aidpc)
NDD influence	-0.023 (0.51)	0.026 (0.11)
POP (index)		-0.133 (0.26)
GNI (index)		-0.001 (0.85)
IMPORTS		0.254 (0.22)
Multi AID		**0.122 (0.09)**
Political and civil rights		-0.069 (0.40)
Growth		0.011 (0.15)
FDI		0.028 (0.60)
Common dynamic factor	**0.62 (0.09)**	**0.86 (0.00)**
Chi2 (prob)	0.50	**0.06**
Countries	126	87

All coefficients represent averages across groups

Table 5: Bilateral aid

	static						dynamic					
Independent variables	Tobit	Tobit	Tobit	Tobit	Tobit		POLS	TOBIT	GMM	POLS	TOBIT	GMM
Non-DAC evolution				0.007 (0.12)	**0.010 (0.07)**					**0.009 (0.07)**	0.008 (0.13)	**0.045 (0.00)**
Non-DAC weight		**0.009 (0.05)**	**0.01 (0.09)**				0.008 (0.12)	**0.010 (0.08)**	**0.036 (0.00)**			
Aid (t-1)	**0.57 (0.00)**	**0.58 (0.00)**	**0.58 (0.00)**	**0.58 (0.00)**	**0.58 (0.00)**		0.79 (0.00)	**0.57 (0.00)**	0.39 (0.00)	0.77 (0.00)	**0.58 (0.00)**	0.39 (0.00)
Popindex	**0.01 (0.00)**	**0.01 (0.00)**	**0.008 (0.00)**	**0.01 (0.00)**	**0.009 (0.00)**		0.002 (0.15)	**0.007 (0.00)**	-0.051 (0.37)	0.002 (0.12)	**0.008 (0.00)**	0.016 (0.80)
Gniindex (GDP pc)	**0.002 (0.00)**	**0.0025 (0.00)**	0.044 (0.21)	**0.002 (0.00)**	**0.066 (0.05)**		**0.004 (0.02)**	-0.002 (0.26)	-0.001 (0.92)	**0.004 (0.01)**	-0.002 (0.26)	0.001 (0.92)
(100-Hai)			0.002 (0.19)		0.001 (0.23)		**-0.002 (0.09)**	0.002 (0.23)	0.04 (0.12)	**-0.0017 (0.09)**	0.001 (0.26)	**0.047 (0.08)**
EVI			0.001 (0.57)		0.0007 (0.38)		-0.001 (0.27)	0.001 (0.51)	-0.006 (0.44)	-0.0015 (0.27)	0.001 (0.59)	-0.006 (0.45)
Political and civil rights	**-0.01 (0.07)**	0.0006 (0.92)	-0.003 (0.68)	0.0002 (0.97)	-0.004 (0.62)		0.001 (0.82)	-0.004 (0.64)	**-0.108 (0.09)**	0.001 (0.85)	-0.004 (0.66)	**-0.11 (0.08)**
Multilateral aid pc	**0.05 (0.00)**	**0.06 (0.00)**	**0.07 (0.00)**	**0.057 (0.00)**	**0.071 (0.00)**		**0.066 (0.00)**	**0.075 (0.00)**	**0.065 (0.09)**	**0.066 (0.00)**	**0.071 (0.00)**	**0.079 (0.047)**
Imports /GDP	**0.077 (0.00)**	**0.11 (0.00)**	**0.18 (0.00)**	**0.10 (0.00)**	**0.17 (0.00)**		**0.052 (0.07)**	**0.185 (0.00)**	0.215 (0.13)	**0.05 (0.09)**	**0.18 (0.00)**	0.212 (0.12)
GDP pc growth	-0.0001 (0.90)	0.0001 (0.92)	-0.0005 (0.00)	0.0008 (0.54)	-0.0003 (0.88)		0.021 (0.57)	**-0.096 (0.08)**	**1.09 (0.02)**	0.023 (0.62)	**-0.10 (0.07)**	0.004 (0.19)
FDI/GDP			**-0.018 (0.00)**		**-0.018 (0.04)**		0.0007 (0.93)	**-0.017 (0.04)**	0.0005 (0.97)	0.0018 (0.82)	**-0.02 (0.047)**	-0.013 (0.43)
Ex-colony dummy	0.096 (0.12)	**0.133 (0.04)**	**0.20 (0.02)**	**0.12 (0.05)**	**0.21 (0.02)**		0.012 (0.78)	**0.21 (0.03)**	-1.69 (0.11)	0.010 (0.81)	**0.212 (0.03)**	-1.14 (0.30)
Intercept	**-0.97 (0.00)**	-0.38 (0.11)	**-0.94 (0.00)**	**-0.56 (0.02)**	**-0.87 (0.00)**		**-0.60 (0.08)**	**-0.48 (0.00)**	0.69 (0.88)	-0.48 (0.17)	-0.46 (0.37)	-2.33 (0.63)
R^2							0.770			0.769		
Observations	16972	11046	8814	11261	8841		8854	8854	8313	8903	8903	8346
Censored	8694	5471	4350	5605	4361			4371			4395	
Rho	0.33	0.32	0.317	0.31	0.31			0.33			0.33	
Hansen									0.15			0.104
AR(2)									0.39			0.397
Instruments									59			63
Group	824	801	717	815	718		717	717	712	718	718	712

Random-effects Tobit model (random-effect time_donor_recipient); Rho = standard deviation of the random effects/standard deviation of residual; p-value clustered by country in brackets.

POLS Estimated with heteroscedasticity-robust standard errors. Year dummies included but not reported; p-value clustered by country (or donor_recipient) in brackets.

Dynamic GMM Blundell and Bond (1998); only lagged variables' estimates are reported. Instruments= Ratio of China and World GDP (proxy of perception of Emerging countries influence on global economy), Average Distance to OECD countries, Language, other measures of economic policies performance and internal instruments.

Table 7: Estimated behaviors by donor (Equation 11)

Independent variables	Canada	France	Germany	Italy	Japan	UK	USA
	POLS	POLS	POLS	POLS	POLS	POLS	POLS
Non-DAC weight		+ + +		+ + +	+ + +		+ +
Pop index	+ +	+ + +	- - -		+		
Gni index			+		+	+ + +	
(100-Hai)	+	+ + +	+ + +	+ + +			
EVI	-		- - -	- -			-
Political and civil rights	+				+	+ + +	
Multilateral aid pc							
Imports/GDP							
GDP ppc (growth)		- - -		- -			
FDI/GDP	- - -	- - -	- -	+ +	- - -	+ + +	
Ex-colony	-	+ + +			- - -		- - -

Method of estimation: POLS (with control time_donor_recipent);

+++ (---) = significant positive (negative) at 1 percent level; ++ (--) = significant positive (negative) at 5 percent level; + (-) = significant positive (negative) at 10 percent level.

Table 8:Estimated donors' Behaviors with estimation of individual aid allocation

Independent variables	Canada	Canada	France	France	Germany	Germany	Italy	Italy	Japan	Japan	UK	UK	USA	USA
	POLS	GMM	POLS	GMM	POLS	GMM	POLS	GMM	POLS	GMM	POLS	GMM	POLS	GMM
Non-DAC weight	0.004	0.035	**0.027**	**0.066**	-0.003	0.02	**0.047**	**0.15**	0.014	0.017	0.006	0.024	-0.006	**0.054**
	(0.65)	(0.17)	**(0.00)**	**(0.01)**	(0.73)	(0.42)	**(0.08)**	**(0.03)**	(0.18)	(0.55)	(0.64)	(0.47)	(0.52)	**(0.07)**
AID (t-1)	**0.80**	**0.39**	**0.87**	**0.65**	**0.81**	**0.44**	**0.51**	0.11	**0.73**	**0.48**	**0.82**	**0.46**	**0.86**	**0.596**
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.11)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Pop index	0.0039	**0.029**	**0.010**	0.014	**-0.005**	-0.004	0.006	0.06	-0.004	-0.003	0.001	**0.034**	-0.001	0.002
	(0.36)	**(0.09)**	**(0.00)**	(0.35)	**(0.03)**	(0.71)	(0.53)	(0.20)	(0.29)	(0.77)	(0.76)	**(0.07)**	(0.70)	(0.87)
Gni index	0.003+	0.004	-0.0004	0.005	**0.003**	0.004	-0.001	-0.021	**0.007**	0.011	**0.007**	**0.03**	-0.001	-0.0018
	(0.11)	(0.73)	(0.82)	(0.56)	**(0.06)**	(0.48)	(0.79)	(0.45)	**(0.00)**	(0.39)	**(0.00)**	**(0.04)**	(0.49)	(0.87)
(100-Hai)	-0.001	0.006	0.003	0.010	-0.002+	0.0007	0.003	0.034	**-0.013**	**-0.031**	-0.0007	-0.017+	0.001	0.006
	(0.45)	(0.45)	(0.13)	(0.22)	(0.10)	(0.90)	(0.57)	(0.12)	**(0.00)**	**(0.00)**	(0.76)	(0.10)	(0.69)	(0.51)
EVI	-0.002	-0.017	**-0.005**	**-0.03**	-0.001	-0.012	-0.009	0.001	0.022	0.011	0.0008	-0.002	0.0015	0.007
	(0.33)	(0.32)	**(0.07)**	**(0.04)**	(0.58)	(0.41)	(0.27)	(0.82)	(0.65)	(0.42)	(0.83)	(0.93)	(0.56)	(0.68)
Political and civil rights	-0.008	-0.052	**0.026**	-0.008	0.005	-0.013	0.033	-0.0056	-0.019	-0.0016	**-0.050**	**-0.111**	0.0005	**-0.062**
	(0.54)	(0.14)	**(0.05)**	(0.82)	(0.58)	(0.69)	(0.34)	(0.94)	(0.23)	(0.96)	**(0.01)**	**(0.06)**	(0.96)	**(0.09)**
Multilateral aid pc	**0.087**	-0.001	-0.011	0.01	**0.11**	**0.095**	**0.35**	-0.031	**0.16**	**0.12**	0.061	-0.034	**0.059**	0.037
	(0.01)	(0.99)	(0.71)	(0.89)	**(0.00)**	**(0.05)**	**(0.00)**	(0.84)	**(0.00)**	**(0.05)**	(0.43)	(0.69)	**(0.06)**	(0.51)
Imports/GDP	0.024	-0.004	-0.019	-0.09	**0.078**	0.012	-0.10	-0.19	**0.17**	0.18	0.06	-0.063	-0.02	-0.038
	(0.55)	(0.88)	(0.74)	(0.78)	**(0.04)**	(0.44)	(0.53)	(0.75)	**(0.01)**	(0.60)	(0.14)	(0.85)	(0.94)	(0.89)
GDP pc (growth)	0.003	**0.017**	0.001	**0.006 +**	0.003	**0.012**	0.003	0.003	0.007	0.008	-0.005	-0.003	0.02	0.002
	(0.30)	**(0.00)**	(0.70)	**(0.11)**	(0.37)	**(0.01)**	(0.76)	(0.78)	(0.25)	(0.34)	(0.44)	(0.73)	(0.75)	(0.74)
FDI/GDP	-0.023 +	-0.004	0.005	0.024	-0.012	-0.03	**0.10**	**0.14**	**-0.034+**	0.002	**0.043**	0.0006	0.015	**0.051 +**
	(0.11)	(0.88)	(0.70)	(0.41)	(0.33)	(0.18)	**(0.02)**	**(0.07)**	**(0.11)**	(0.95)	**(0.05)**	(0.99)	(0.34)	**(0.10)**
Ex-colony (dummy)	-0.11	-0.293	**0.12**	**0.37 +**	0.023	0.29	0.14	0.57	**-0.15**	-0.22	-0.054	0.097	**-0.107**	-0.046
	(0.26)	(0.40)	**(0.10)**	**(0.11)**	(0.75)	(0.42)	(0.62)	(0.45)	**(0.04)**	(0.23)	(0.54)	(0.77)	**(0.07)**	(0.82)
intercept	-0.09	-0.46	-0.34	0.14	-0.31	-0.20	**-1.56**	-3.07	0.026	-0.22	-0.57	-1.63	0.22	-0.017
	(0.68)	(0.45)	(0.29)	(0.11)	(0.16)	(0.76)	**(0.09)**	(0.28)	(0.94)	(0.87)	(0.19)	(0.25)	(0.40)	(0.98)
R^2	0.81		0.84		0.78		0.57		0.74		0.78		0.81	
Observations	1378	1378	1359	1359	1383	1383	1004	1004	1347	1347	1217	1217	1170	1170
AR(2)		0.49		0.88		0.72		0.80		0.64		0.07		0.64
Hansen		0.27		0.21		0.78		0.50		0.14		0.04		0.67
Instruments		66		66		66		66		66		66		66
Countries	105	105	107	107	107	107	94	94	108	108	105	105	105	105

Table 9: Impact of NDD influence on DAC allocation quality

	Multilateral aid				Bilateral aid		
Independent variables	POLS	TOBIT	GMM		POLS	TOBIT	GMM
Non-DAC influence					**0.039** **(0.02)**	0.014 (0.51)	**0.12** **(0.00)**
Non-DAC influence	-0.07 (0.47)	**-0.25** **(0.00)**	**-0.46** **(0.00)**				
Pop index	**0.022** **(0.04)**	**0.03** **(0.00)**	0.000 (0.99)		-0.001 (0.97)	0.013 (0.65)	-0.07 (0.16)
Gni index	**0.016** **(0.05)**	0.006 (0.28)	0.02 (0.14)		**0.011** **(0.02)**	**0.012** **(0.01)**	-0.009 (0.28)
(100-Hai)	0.002 (0.80)	**0.015** **(0.00)**	-0.016 (0.16)		**0.024** **(0.05)**	**0.039** **(0.00)**	**0.05** **(0.08)**
EVI	**-0.026** **(0.02)**	-0.003 (0.68)	0.002 (0.92)		-0.008 (0.19)	-0.0003 (0.95)	0.011 (0.37)
Political and civil rights	0.078 (0.17)	0.069 (0.11)	**0.16** **(0.08)**		-0.005 (0.66)	-0.010 (0.43)	**-0.089** **(0.04)**
Multilateral aid pc	**0.51** **(0.00)**	**0.33** **(0.00)**	**0.26** **(0.00)**		**0.062** **(0.00)**	**0.074** **(0.00)**	0.038 (0.34)
Openness /GDP	**0.31** **(0.01)**	**0.40** **(0.00)**	**0.42** **(0.07)**		-0.12 (0.15)	0.044 (0.55)	**0.285** **(0.05)**
GDP pc (growth)	0.009 (0.37)	**0.011** **(0.06)**	0.007 (0.37)		-0.003 (0.64)	**-0.009** **(0.058)**	-0.001 (0.77)
FDI/GDP	**-0.066** **(0.03)**	-0.017 (0.39)	**-0.063** **(0.08)**		-0.006 (0.64)	-0.014 (0.19)	-0.020 (0.25)
Ex-colony dummy	-0.012 (0.94)	-0.021 (0.92)	-0.20 (0.22)		-0.014 (0.73)	0.10 (0.27)	-0.63 (0.29)
nDAC*(100-Hai)	0.0003 (0.85)	0.0002 (0.77)	**-0.003** **(0.08)**		**0.0011** **(0.00)**	**0.0009** **(0.028)**	**0.002** **(0.01)**
nDAC*EVI	**-0.004** **(0.08)**	-0.002 (0.24)	-0.003 (0.38)		-0.0006 (0.34)	-0.0007 (0.30)	-0.0005 (0.75)
nDAC*POP	-0.0002 (0.92)	0.002 (0.11)	**0.004** **(0.08)**		-0.0003 (0.55)	0.0003 (0.58)	-0.0007 (0.45)
nDAC*GNI	0.0023 (0.14)	**0.002** **(0.03)**	**0.005** **(0.01)**		-0.0005 (0.15)	-0.0005 (0.29)	**-0.002** **(0.00)**
nDAC*Polity	**0.018** **(0.10)**	**0.016** **(0.04)**	**0.043** **(0.00)**		-0.0015 (0.53)	0.0005 (0.82)	0.003 (0.47)
Intercept	-0.62 (0.39)	**-2.06** **(0.00)**	**-2.51** **(0.09)**		**-0.37** **(0.04)**	**-1.22** **(0.00)**	-1.35 (0.31)
R^2	0.69				0.77		
Observations	640	640	599		8327	8327	8313
Censored		20				4102	
Rho		0.63				0.37	
AR(2)			0.10				0.39
Hansen			0.23				0.10
Instruments			60				85
Group	108	108	107		718	718	718

Table 10: Instrumentation [NDDs weight= {ratio GDPchina/World; NDDs evolution}]

	Annual	3-year		Annual	3-year
Independent variables	IV-POLS[a]	IV-POLS		IV-POLS	IV-POLS
Non-DAC influence	**-0.064 (0.00)**	**-0.072 (0.00)**		**-0.48 (0.00)**	**-0.74 (0.00)**
Lagged DAC Aid	**0.74 (0.00)**	**0.61 (0.00)**		**0.62 (0.01)**	**0.61 (0.00)**
Pop index	**0.005 (0.02)**	-0.001 (0.66)		**0.022 (0.00)**	**0.027 (0.00)**
Gni index	**0.0034 (0.01)**	0.0014 (0.50)		**0.015 (0.00)**	**0.018 (0.00)**
(100-Hai)	**-0.0027 (0.02)**	-0.0011 (0.57)		**-0.014 (0.00)**	-0.0037 (0.41)
EVI	-0.002 (0.23)	0.004 (0.24)		-0.009 (0.25)	0.005 (0.52)
Political and civil rights	0.01 (0.25)	0.003 (0.79)		**0.25 (0.00)**	**0.266 (0.00)**
Multilateral aid pc	**0.135 (0.00)**	**0.24 (0.00)**		**0.166 (0.00)**	**0.26 (0.00)**
Openness /GDP	**0.10 (0.00)**	**0.22 (0.00)**		**0.22 (0.00)**	**0.21 (0.00)**
GDP pc growth	0.002 (0.37)	**0.017 (0.00)**		0.006 (0.22)	**0.015 (0.02)**
FDI/GDP	-0.003 (0.77)	-0.0017 (0.56)		0.0056 (0.89)	-0.008 (0.66)
Ex-colony dummy	-0.043 (0.42)	**-0.165 (0.08)**		-0.095 (0.36)	**-0.27 (0.01)**
nDAC*(100-Hai)				**-0.002 (0.01)**	-0.002 (0.60)
nDAC*EVI				-0.0003 (0.78)	0.0001 (0.92)
nDAC*POP				0.001 (0.15)	**0.006 (0.00)**
nDAC*GNI				**0.002 (0.01)**	**0.003 (0.00)**
nDAC*Political rights & civil liberties				**0.047 (0.00)**	**0.05 (0.00)**
Intercept	**-0.48 (0.02)**	**-0.59 (0.04)**		**-2.96 (0.00)**	**-3.93 (0.00)**
R^2	0.86	0.87		0.63	0.84
Observations	1272	590		1267	590
Countries	108	107		108	107

a: Baltagi & Chang (2000) consistent estimator

Table 11: Instrumentation [NDDs weight= {ratio GDPchina/World; NDDs evolution}]

	Annual	3-year av		Annual	3-year av
Independent variables	IV-Tobit	IV-Tobit		IV-Tobit	IV-Tobit
Non-DAC influence	**-0.054 (0.00)**	**-0.065 (0.00)**		**-0.39 (0.00)**	**-0.59 (0.00)**
Lagged DAC aid	**0.78 (0.00)**	**0.68 (0.00)**		**0.71 (0.00)**	**0.67 (0.00)**
Pop index	**0.005 (0.03)**	-0.003 (0.33)		**0.023 (0.00)**	**0.021 (0.06)**
Gni index	0.0015 (0.22)	0.001 (0.50)		**0.01 (0.06)**	**0.017 (0.00)**
(100-Hai)	-0.0013 (0.90)	-0.001 (0.33)		-0.005 (0.39)	-0.004 (0.42)
EVI	-0.0028 (0.15)	0.003 (0.27)		-0.011 (0.19)	-0.0005 (0.96)
Political and civil rights	**0.018 (0.04)**	0.008 (0.50)		**0.22 (0.00)**	**0.233 (0.00)**
Multilateral aid pc	**0.096 (0.00)**	**0.22 (0.00)**		**0.088 (0.00)**	**0.24 (0.00)**
Openness /GDP	**0.11 (0.00)**	**0.188 (0.00)**		**0.196 (0.00)**	**0.187 (0.00)**
GDP pc growth	-0.003 (0.19)	**0.018 (0.01)**		0.004 (0.30)	**0.018 (0.00)**
FDI/GDP	-0.013 (0.16)	-0.008 (0.64)		-0.022 (0.55)	-0.012 (0.42)
Ex-colony dummy	0.001 (0.98)	-0.15 (0.15)		-0.028 (0.78)	**-0.24 (0.03)**
nDAC*(100-Hai)				-0.002 (0.16)	-0.0003 (0.71)
nDAC*EVI				-0.001 (0.64)	-0.0006 (0.75)
nDAC*POP				0.0015 (0.19)	**0.004 (0.02)**
nDAC*GNI				**0.002 (0.07)**	**0.003 (0.00)**
nDAC*Polity				**0.14 (0.00)**	**0.045 (0.00)**
Intercept	**-0.51 (0.00)**	**-0.47 (0.08)**		**-2.63 (0.00)**	**-3.15 (0.00)**
censored	39	16		39	16
Observations	1272	590		1268	590
Countries	108	107		108	107

Tobit model with endogeneous regressors/ Estimation method: Maximum likelihood estimator clustered

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Appendix

Collinearity Diagnostics

Variable	VIF	SQRT VIF	Tolerance	R-Squared
multiaidpc	1.24	1.11	0.8080	0.1920
importsofgdp	8.04	2.84	0.1243	0.8757
tradegdp	7.98	2.82	0.1253	0.8747
fdiofgdp	1.37	1.17	0.7324	0.2676
pop	1.22	1.10	0.8211	0.1789
gnipc	2.02	1.42	0.4962	0.5038
gdppcgr	1.11	1.05	0.9000	0.1000
evi	1.46	1.21	0.6849	0.3151
Hai	2.42	1.55	0.4138	0.5862
polityrights	5.16	2.27	0.1937	0.8063
civilrights	5.59	2.36	0.1790	0.8210
distoecd	1.42	1.19	0.7059	0.2941
coloecd	1.05	1.02	0.9532	0.0468
wndac1	1.02	1.01	0.9769	0.0231
ndacevol	1.07	1.03	0.9370	0.0630
gdprelus	1.28	1.13	0.7817	0.2183

Mean VIF 2.71

	Eigenvalues	Cond Index
1	3.7582	1.0000
2	2.0182	1.3646
3	1.4720	1.5978
4	1.2015	1.7686
5	1.0225	1.9172
6	0.9952	1.9432
7	0.9575	1.9812
8	0.8858	2.0597
9	0.8298	2.1281
10	0.6664	2.3748
11	0.6623	2.3822
12	0.5928	2.5179
13	0.4943	2.7574
14	0.2786	3.6730
15	0.1005	6.1153
16	0.0644	7.6407

Condition Number 7.6407

Eigenvalues & Condition index computed from deviation sscp (no intercept)

Det(correlation matrix) 0.0022

Data description :

Variable	**Definition**	**Source**
dacpc	Per capita aid (DAC commitments)	OECD-CRS
nonDac Influence	Share of nonDAC aid in total ODA	OECD-CRS
nonDAC ODA	ODA received from emerging donors	OECD-CRS
EVI	Economic Vulnerability Index	CERDI
Human capital	Human asset index (HAI)	CERDI
Imports	Imports of goods and services (% of GDP)	WDI
Trade	Trade Openness	IMF-WDI
FDI	Foreign direct investment ((% of GDP)	WDI
coloecd	Former colonies	CEPII
gdppcgr	Gross domestic product per capita growth rate	WDI
popindex	Population (standardized)	WDI-author' calculation
gdprelus	Ratio China GDP to World GDP	WDI
gnindex	GNI per capita (standardized)	UNSTAT -author' calculation

Correlation matrix

	ldacpc	lmultiaidpc	limports	ltrade	lfdi	popindex	gnindex	gdppcgr	evi	Hai	polityrights	civilrights	distoecd	coloecd	influ	lndacevol	gdprelus
ldacpc	1.0000																
lmultiaidpc	0.7464	1.0000															
limports	0.5226	0.5211	1.0000														
ltrade	0.3937	0.3842	0.9379	1.0000													
lfdi	0.1677	0.2352	0.4662	0.5066	1.0000												
popindex	0.6325	0.6975	0.6209	0.5701	0.2767	1.0000											
gnindex	0.0824	0.1166	-0.1425	-0.3067	-0.2352	-0.3246	1.0000										
gdppcgr	0.0041	0.0570	0.1117	0.1143	0.1817	0.0051	-0.0808	1.0000									
evi	0.4923	0.5434	0.4041	0.2964	0.1159	0.7061	0.1068	0.0173	1.0000								
Hai	0.0622	0.1074	-0.2235	-0.3564	-0.3197	-0.2232	0.8100	-0.1713	0.1030	1.0000							
polityrights	-0.0940	-0.0885	-0.1772	-0.2021	-0.2801	-0.2481	0.4097	-0.1221	-0.0359	0.4872	1.0000						
civilrights	-0.1423	-0.1776	-0.2535	-0.2713	-0.3418	-0.3297	0.4234	-0.1192	-0.0730	0.5131	0.8918	1.0000					
distoecd	0.0984	-0.0029	0.1279	0.1393	0.1724	0.1966	-0.2681	0.0574	0.1859	-0.3872	-0.4362	-0.4509	1.0000				
coloecd	0.1131	0.1381	0.0549	0.0357	0.1291	0.0806	-0.0265	-0.0462	-0.0193	-0.0261	-0.0803	-0.1251	0.1523	1.0000			
Non-dacinflu	-0.0502	0.0168	0.1132	0.1378	0.0031	0.1604	-0.2375	-0.0002	-0.0313	-0.1018	0.0829	0.0787	-0.3385	-0.0662	1.0000		
lndacevol	-0.0731	0.0684	0.1188	0.1351	0.0091	0.1838	-0.2019	0.0055	-0.0009	-0.0703	0.0793	0.0667	-0.3534	-0.0591	0.9797	1.0000	
gdprelus	-0.0530	0.1392	0.1076	0.1285	0.3088	-0.0778	-0.0613	0.1803	-0.1364	-0.2693	-0.1030	-0.1797	0.0571	-0.0538	-0.0998	-0.0826	1.000

Gross concessional flows for development co-operation from non-DAC donors reported to DAC (*Current USD Millions)*

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bulgaria											40,49	48,38
Chinese Taipei					420,96	483	513	514	435,2	411,35	380,91	381,24
Cyprus						15,1	26,02	34,88	37,44	45,5	51,17	37,61
Czech Republic	16,16	26,49	45,43	90,55	108,28	135,15	160,87	178,88	249,21	214,7	227,56	250,46
Estonia	0,52	0,49	1,25	1,08	4,84	9,5	14,02	16,12	22,01	18,44	18,76	24,21
Hungary				21,23	70,14	100,37	149,49	103,47	106,94	116,92	114,34	139,73
Israel	164,39	92,48	130,89	111,68	83,85	95,24	89,83	110,94	137,82	123,9	144,82	206,19
Kuwait	165,03	73,43	20,38	137,79	160,94	218,46	157,93	110,07	283,18	221,12	210,56	144,496225
Latvia			1,5	0,88	8,33	10,65	11,81	15,79	21,85	21	15,6	19,2
Liechtenstein								17,97	23,69	26,24	26,63	31,06
Lithuania		1,75	1,64	1,91	9,07	15,53	25,04	47,6	47,84	36,21	36,74	51,68
Malta										13,69	13,8	19,96
Poland	28,81	35,56	14,26	27,14	117,51	204,79	296,82	362,85	372,34	374,65	377,75	416,91
Romania									122,86	152,54	114,26	163,85
Russia											472,39	478,99
Saudi Arabia	275,5	205,07	2477,75	2390,85	1734,08	1026,18	2024,9	1550,65	4978,83	3133,74	3479,64	5094,9
Slovak Republic	5,86	8,28	6,68	15,07	28,19	56,83	55,11	67,23	91,85	75,4	73,71	86,02
Slovenia						34,67	44,01	54,14	67,6	71,24	58,6	62,77
Thailand							73,73	66,91	178,45	40,21	9,62	31,49
Turkey	81,88	64,11	72,96	66,63	339,16	601,04	714,34	602,33	780,36	707,17	967,42	1273,01
United Arab Emirates	399,24	487,19	558,06	926,3	484,77	509,83	782,68	2425,59	1265,75	833,67	412,07	737,357
Brazil								291,9	336,8	362,2	437	450
Russia											472,32	478,99
China								1466,86	1807,57	1947,65	2010,61	2468,0567
India								392,6	609,5	488,04	639,069003	730,659625
South Africa								82,3101234	86,04	82,5081379	87,6509883	95,1

Source : OECD website

PART 3. IMPACT OF INTERNATIONAL MEASURES FOR DEVELOPMENT

Chapter 5.Revisiting the Role of Development Finance on Business Cycles in Developing Countries: DSGE Forecasting and Panel Analysis

Abstract:

This paper examines the extent to which external capital flows, particularly development finance flows, lead to macroeconomic volatility in recipient countries. We begin by estimating a DSGE model of a small open economy calibrated to represent a typical developing country, recipient of foreign aid, remittances and foreign direct investment. The predictions of the model are confirmed by our panel VAR results, which show that development finance shocks account for more than twenty-five percent of economic fluctuations in aggregate output.

JEL Code : C68, F21, F24, F35, F41, E32

Keywords: *Real business cycle; External shocks; Economic fluctuations; Foreign aid; Remittances; Foreign investment*

5.1. Introduction

Compared to other countries, developing countries (DCs) are particularly vulnerable to sharp swings in commodity prices, natural disasters, and variable external financing flows. Furthermore, DCs' growing trade and financial linkages with the rest of the world, which can confer important benefits through growth and investment, could also increase their exposure to costly spillovers from abroad. At the same time, their underlying vulnerabilities and weak policy environment can amplify the impact of external shocks, and limit their capacity to absorb and mitigate them.

The dominant transmission channels of economic fluctuations in DCs are trade flows, Foreign investment, remittances, terms of trade, foreign aid, and, to a lesser extent, financial sector flows(IMF, 2011). While the direct financial sector impact of shocks can be muted in DCs, reflecting their still limited financial integration, these economies can face significant risks if the receive large amount of remittances as explained by Barajas et al. (2012). They show that accounting for remittance dependency, some recipient countries appear more vulnerable to risks stemming from shocks to the global economy.In fact, their results reveal that remittance flows significantly increase business cycle synchronization between recipient countries and the rest of the world. Moreover, the remittance channel effect is shown to be asymmetric, that is, remittances are more effective in channeling economic downturns than booms to the receiving countries from the sending countries.

Crispolti and Tsibouris (2012) show that shocks in foreign aid and FDI are more frequent than shocks in terms of trade and external demand in the last decades. These recent empirical evidences suggest that the presence of development finance flows offers both opportunities and challenges to recipient countries. They can induce macroeconomic fluctuations in a small open economy by several channels. As foreign aid, remittances and FDI are major source of capital for many DCs, it is important to consider their implications for economic activity.

Concerning aid flows, the problem is almost related to the real exchange rate appreciation and variability of foreign aid, which increase the volatility of domestic investment and consumption.

This paper objective is twofold. The first is to lay out a dynamic stochastic general equilibrium (DSGE) model that is helpful to document the relation between external capital flows (ECF) and business cycles in developing economies and understand the adverse spillovers effects that can be generated by development cooperation and finance. The second is to quantify and describe the nature of these shocks on macroeconomic volatility. Thus, we seek to measure the contribution of ECF for development finance to the high volatility of output in DCs, in comparison to other external shocks and domestic shocks. Such analysis is useful if we need to improve the effectiveness of these flows.

In recent years, focus has been on how well Real Business Cycle (RBC) models explain stylized facts of business cycles. Despite its remarkable success, the standard small open economy RBC model performs poorly when applied to developing economies. As Schmitt-Grohé and Uribe (2003) point out, the small open economy RBC model predicts the trade balance-to-output ratio to be positively correlated with output and predicts consumption to be smoother than output. However, most developing economies are characterized by countercyclical trade balance and more volatile consumption. Developing countries have a relative volatility of consumption to output of about 1.46, while in developed countries it is around 0.92. This and other differences between the business cycle in developed and developing countries have been documented by Mendoza (1991), Rand and Tarp (2002), Neumeyer and Perri (2005) or Aguiar and Gopinath (2007) among others. Some authors argue that developing countries are characterized by a plurality of distortions and market failures that make standard neoclassical models an inadequate framework to analyze those economies.

Assessing the conformity of model results with the observed characteristics of business cycles is essential for the validation of theoretical business cycle models. We therefore introduce in the theoretical dynamic stochastic general equilibrium model some striking structural features, profoundly discernible, and noticeably in many DCs. First, the model embeds the framework explained by Berg et al. (2010) that describes the macroeconomic challenges faced by aid recipients. Second, we incorporate the remittances and foreign direct investment shocks. Therefore, we complete the model by introducing remittances in the household budget constraint but also in the government domestic bonds available through savings[1] (Chami et al., 2008). Furthermore, following Acosta et al. (2009) we take into account the impact of foreign direct investment in the formation of investment. The interest to add FDI as external capital flows also comes from the fact that with the current trends in the aid architecture and the growing influence of emerging donors, aid is (returns) strongly linked to trade and FDI flows. Walz and Ramachandran (2011) argued the majority of aid from emerging countries, especially China, India, and Venezuela, is combined with special trade arrangements and commercial investments. Statistics show that is not uncommon; many traditional donors also give tied aid, despite an official policy of untying. For example, 64 percent of South Korea's aid is tied, 45 percent of Greece's aid, and 23 percent of the United States' aid is tied.

Usually, after a DSGE simulation the model is estimated with observed data to ensure the performance of the model. However, in the case of DCs as high-frequency data that would define the cycle are generally unavailable, we deemed it inappropriate to follow this strategy. We chose to add an analysis with panel data to quantify the importance of ECF in the volatility of output and to describe the nature of this impact on volatility, distinguishing also their impact on the frequency and the amplitude of the output fluctuations. To assess the

[1] According to Chami et al. (2008), an increase in the level of the remittances-to-GDP ratio, everything else equal, improves external sustainability. Remittances also have indirect beneficial effects on debt dynamics to the extent that their presence reduces external borrowing costs and causes the domestic currency to appreciate.

performance of the model, we check if our RBC model for a small open economy is consistent with DCs key stylized facts. Specifically, the excess volatility of consumption with respect to output, the countercyclical nature of the trade balance-to-output (TBY) ratio and its downward sloping autocorrelation function.

Including the basic features associated with a LIC, this research's analytical framework would be more likely to minimize the conflict between theoretical predictions and empirical evidence, or between normative implications and policy practice. This work could help to refine and develop additional quantitative tools to assess risks and vulnerabilities in DCs. Indeed, this work seeks to represent the exposition of DCs to external capital flows and thus propose a model that could help to make a step further to a RBC adapted to DCs economies. Moreover, this paper aims to analyze the economic shocks (external and domestic) faced by DCs and thus brings new light on Raddatz (2009) findings about the relative contribution of various shocks to macroeconomic fluctuations, taking into account the development finance flows. Following Arellano et al. (2009), we will associate panel data analysis to DSGE modeling in order to enlighten our theoretical section with real economic activity.

This paper examines the extent to which external shocks, particularly shocks in development finance flows, lead to macroeconomic volatility in recipient countries. We begin by estimating a DSGE model of a small open economy calibrated to represent a typicalDCs, recipient of foreign aid, remittances and foreign direct investment. To these specific external shocks we also consider traditional trade shocks, modeled as fluctuations in the prices of (exported and imported) primary commodities and external demand, we consider domestic macroeconomic shocks modeled as fluctuations in inflation, among others. The predictions of the model are confirmed by our panel VAR results, which show that development finance shocks account for more than twenty-five percent of economic fluctuations in aggregate output.

Our others findings concern the controversy about the procyclicity or countercyclicity of these flows. There is more than suggestive evidence that international aid does not contribute to reducing instability in DCs, and may even be a source of additional volatility itself. Global assistance to poor countries in response to exogenous shocks has been primarily *ad hoc* in nature, and displays large volatility (Bulir and Hamann, 2003). Furthermore, several papers have documented that remittances to developing countries are countercyclical with respect to recipient economies' business cycle (Frankel (2011) and Ebeke (2011)), while others have shown that remittances tend to be more procyclical (Lueth and Ruiz-Arranz (2008) , Neagu and Schiff (2009), Giuliano and Ruiz-Arranz, 2009). Our panel regression estimates suggest that aid flows do have a clear counter cyclical pattern (at least during the last two decades), as would be desirable to help smooth economic shocks. We also show that remittance flows have become more countercyclical in recent decades as more developing economies appear to have integrated into the world economy, and are therefore more vulnerable to various types of external shocks.

The remainder of the paper is organized as follows. In Section 2, we present the structure of the DCsbusiness cycle model. Section 3 discusses the calibration of the model and the simulation results. Section 4 explains the methodological approach and discusses the results of the empirical analysis on panel data. Finally, section 5 concludes.

5.2. The Real Business Cycle Model

Consider an infinite-horizon small open economy. The economy has two goods, a home-produced good and an imported good, and consists of the following agents: i) households (income, remittances) participating in asset markets; ii) two sectors with firms producing imported and exportable goods using labor, domestic and foreign private capital, and public capital; iii) a central bank in charge of exchange rate policy and monetary policy, including

reserve accumulation policy; and iv) a fiscal authority that is the direct recipient of aid and decides how much of this aid to spend as part of its fiscal policy.

A. Households

The economy is inhabited by a representative agent who maximizes the expected value of lifetime utility as given by:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[\log(C_t) - \frac{1}{1+\varphi} (L_t)^{1+\varphi} \right]$$

where C_t and L_t represent period t consumption index and labor. The household's composite consumption index C_t is a nested constant elasticity of substitution (CES), which combines the household's consumption of domestically produced goods $C_{h,t}$ and imported goods $C_{M,t}$:

$C_t = \left[\gamma_h^{\frac{1}{\rho_h}} (C_{h,t})^{\frac{\rho_h - 1}{\rho_h}} + (1-\gamma_h)^{\frac{1}{\rho_h}} (C_{M,t})^{\frac{\rho_h - 1}{\rho_h}} \right]^{\frac{\rho_h}{\rho_h - 1}}$, where γ_h is consumption of home goods bias and ρ_h elasticity of substitution between imported and domestically produced goods.

Households decide how to allocate consumption expenditures prior to the associated consumer price index : $P_t = \left[\gamma_h (P_{h,t})^{1-\rho_h} + (1-\gamma_h)(P_{M,t})^{1-\rho_h} \right]^{\frac{1}{1-\rho_h}}$.

The price of the home-produced good serves as the numeraire.

The maximization is done subject to the budget constraint:

$$C_t + b_t^h = (1-\tau) w_t l_t + i_{t-1} \frac{b_{t-1}^h}{\pi_t} + s_t REM_t$$

where REM are remittances received, s is exchange rate, b_h households bonds to government, I interest rate , π is inflation. Remittances follow a stochastic process:

$$REM_t = \overline{REM} + \rho_{re} \left(REM_{t-1} - \overline{REM} \right) + \varepsilon_t^{re}$$

Remittances are unrequited, nonmarket personal transfers between households across countries, and as such they enter the household budget constraint as an addition to income separate from the domestic production process. Previously accumulated real government

bonds (B), income from production (Y) net of taxes, and real remittance transfers (REM) are all used to finance household expenditures (C)[2].

B. Firms

The investment unit solves a cost minimization problem to determine demands for raw domestic and specific foreign investment inputs, whereas the optimal level of total final investment I_t is determined by the production unit. Capital acquisition is subject to adjustment costs and, hence, implies a forward-looking behavior. The capital stock K_t changes according to the following equation

$K_{t+1} = I_t + (1-\delta)K_t$, where δ is the depreciation rate.

- Investment Unit:

The investment unit combines domestic raw investment I_h and the specific foreign direct investment good I_f to produce investment I_t[3]. A constant returns to scale technology allows us to express the investment function in aggregate terms as follows:

$$I_t = \left[(\gamma_i)^{\frac{1}{\rho_i}} (I_{h,t})^{\frac{\rho_i - 1}{\rho_i}} + (1-\gamma_i)^{\frac{1}{\rho_i}} (I_{f,t})^{\frac{\rho_i - 1}{\rho_i}} \right]^{\frac{\rho_i}{\rho_i - 1}},$$

with foreign investment following a stochastic process $I_{f,t} = \bar{I}_f + \rho_{if}(I_{f,t-1} - \bar{I}_f) + \varepsilon_t^{if}$.

Associated with this investment technology is a minimized unit cost function, i.e. the replacement cost of capital denoted as P_I, which depends on P_{IF}. P_{IF} is the price of the imported investment in units of domestic currency. For any given rate of investment, I_t, the firm's minimization problem is as follows:

$$Min \quad I_{h,t} + P_{IF,t} I_{F,t}$$

$$\text{s.t. } I_t \leq \left[(\gamma_i)^{\frac{1}{\rho_i}} (I_{h,t})^{\frac{\rho_i - 1}{\rho_i}} + (1-\gamma_i)^{\frac{1}{\rho_i}} (I_{f,t})^{\frac{\rho_i - 1}{\rho_i}} \right]^{\frac{\rho_i}{\rho_i - 1}},$$

[2] This specification is inspired of Berg et al. (2010) and previous IMF models.

[3] Acosta et al. (2009) proposed this specification in their analysis of remittances Dutch disease hypothesis.

where γ_i is the share of investment expenditure on the domestic component of investment, ρ_i is the elasticity of substitution between home and foreign investment, and P_I is the minimum unit cost function for I_t, which is expressed as

$$P_{I,t} = \left[\gamma_i + (1-\gamma_i)P_{IF,t}^{\,1-\rho_i}\right]^{\frac{1}{1-\rho_i}}.$$

- Production Unit:

The representative firm is endowed with the following constant returns to scale technology:

$$Y_t = a_t\left(K_t^{\phi_q} q_t^{1-\phi_q}\right)^{1-\alpha} l_t^{\alpha}$$

where a_t is an exogenous productivity shock; l_t it is the amount of labor employed, K_t is private capital, which is firm-specific, and q_t is public capital. The coefficient α indicates the production share of labor, while φ_q denotes the share of private capital in total capital used in production. Private capital is subject to a depreciation rate δ.

The unit solves the maximization problem by which total final investment is determined. The installation cost of capital is given by:

$\frac{\psi}{2}\left(\frac{I_t}{K_t} - \delta\right)^2 K_t$ where ψ governs the size of the installation cost.

It maximizes the present discounted value of dividends:

$$Max \quad E_t \sum_{t=0}^{\infty} \Omega_t \left[Y_t - P_{I,t}\left(I_t + \frac{\psi}{2}\left(\frac{I_t}{K_t} - \delta\right)^2 K_t \right) - w_t l_t \right]$$

subject to $K_{t+1} = I_t + (1-\delta)K_t$.

The optimality conditions for K_{t+1}, I_t and l_t respectively are:

$$E_t\Omega_{t+1}\left((1-\alpha)\frac{Y_{t+1}}{K_{t+1}} - P_{I,t+1}\left[\frac{\psi}{2}\left(\frac{I_{t+1}}{K_{t+1}} - \delta\right)^2 - \psi\left(\frac{I_{t+1}}{K_{t+1}} - \delta\right)\frac{I_{t+1}}{K_{t+1}} \right] + \lambda_{I,t+1}(1-\delta) \right) = \lambda_{I,t} \quad (1)$$

$$P_{I,t}\left(1 + \psi\left(\frac{I_t}{K_t} - \delta\right)\right) = \lambda_{I,t} \quad (2)$$

$$W_t = \alpha\frac{Y_t}{L_t} \quad (3)$$

The Euler describes the evolution of λ_I, the shadow price of a unit of capital. Eq. (2) shows that net investment equals zero when the shadow value of a unit of capital, λ_I, equals its replacement cost, i.e. the price of new uninstalled capital, P_I.

The real exchange rate e_t is defined as the ratio of the price of the foreign consumption basket to the domestic one, $e_t = P_{F,t} / P_t$, where $P_{F,t}$ is the foreign consumer price index in units of foreign currency. Based on the description of the consumption composites, a rise in the relative price of domestic non-tradables leads to an appreciation of the real exchange rate (e_t decreases). The price of the foreign investment good, P_{IF}, serves to pin down the evolution of foreign capital inflow. It follows an exogenous stochastic process.

-Exportation sector

Producers export domestically produced goods on foreign competitive goods markets at an exogenous price since the small open economy is price taker. Domestically produced goods are purchased by foreign households. We assume that foreign households' aggregate consumption is described by a CES function that combines home produced and import goods as following:

$$C_{w,t} = \left[\gamma_x^{\frac{1}{\rho_x}} (X_t)^{\frac{\rho_x - 1}{\rho_x}} + (1-\gamma_x)^{\frac{1}{\rho_x}} (C_{f,t})^{\frac{\rho_x - 1}{\rho_x}} \right]^{\frac{\rho_x}{\rho_x - 1}}$$

where γ_x is the share of the home economy's exports in the rest of the world consumption index and ρ_x is the elasticity of substitution between the home economy's exports and the foreign produced goods.

The export demand is given by the relation

$$X_t = \gamma_x \left(\frac{P_{h,t}}{s_t P_{M,t}} \right)^{-\rho_x} C_{w,t}$$

The rest of the world's aggregate consumption $C_{w,t}$ is exogenous for the economy and its path is assumed to evolve along a stochastic log-linear autoregressive process.

C. The Government

Governments face potentially good opportunities for public investment but have limited access to external capital and find raising taxes very costly. The government is the direct recipient of foreign aid A, which follows the process

$$A_t = \overline{A} + \rho_A\left(A_{t-1} - \overline{A}\right) + \varepsilon_t^A,$$

where $\overline{A}$ is the steady state level of aid, A_t corresponds to an exogenous increase in aid at time t, and ρ_A (0; 1) is a parameter that measures the degree of persistence of the increase in aid.

The government can finance its spending g_t through a variety of sources: taxes on labor income and capital, using the domestic currency value of aid proceeds, drawing down on deposits held at the central bank, or issuing domestic debt net of amortization. This domestic debt (b_t) is held by households that can save ($b_{h,t}$) and by the central bank ($b_{c,t}$). The government also pays interest on the share of government debt that is held by consumers. Then we can write the period-by-period government budget constraint following Berg et al. (2010) as:

$$g_t = \tau w_t l_t + \tau_k K_t + s_t A_t - \left(d_t - \frac{d_{t-1}}{\pi_t}\right) - \frac{i_{t-1} - 1}{\pi_t} b_{t-1}^c + \left(b_t - \frac{b_{t-1}}{\pi_t}\right)$$

where $b_t = b_t^h + b_t^c$.

Government spending g_t, which is endogenously determined by the constraint above, can be used for public consumption or investment purposes. We distinguish between the public investment that is a constant share of steady-state government spending and the public investment associated with the increase in aid. These investments serve to accumulate public capital q_t following:

$$q_t = \left(1 - \delta_g\right) q_{t-1} + \mu_s \overline{g} + \mu_A\left(g_t - \overline{g}\right)$$

where δ_g is the depreciation rate of public capital, μ_s and μ_A measure the efficiencies of the two types of public investment.

The accumulation of government deposits is described by the following rule, which depends on the increase in aid:

$$d_t = \rho_d d_{t-1} + (1-\rho_d)\bar{d} + (1-\gamma_A)s_t\left(A_t - \bar{A}\right)$$

where $\bar{d}$ is the steady-state level deposits, and d (0; 1). An increase in aid may or may not be spent initially, depending on the policy parameter [0; 1]. If aid is not spent, it will initially accumulate as deposits but will be gradually spent over time. Both ρ_d and γ_A determine the speed of spending.

We introduce the impact of remittances on government revenue in our model through the impact of workers' remittances on the sustainability of government debt[4] as:

$$b_{t+1}^h = \frac{(1+i_t)}{(1+\pi_t)(1+G)}\frac{\eta_t}{\eta_{t+1}}b_t^h - ((\tau w_t l_t + \tau_k K_t) - g_t)$$

with $\eta_t = 1 + {(REM_t s_t)}/{Y_t}$.

For a given exchange rate, an increase in the ratio of remittances to GDP in period t + 1 relative to period t improves debt dynamics, since η_{t+1} increases relative to η_t. Essentially, the government's potential revenue base has increased[5].

D. The Central Bank

The central bank is supposed to engage foreign exchange and open market operations corresponding to the amount of aid spend by the government, as well as the remittances and foreign investment inflows. Thus, we introduce the Central Bank balance sheet

$$b_t^c - \frac{b_{t-1}^c}{\pi_t} = \left(d_t - \frac{d_{t-1}}{\pi_t}\right) - s_t\left(R_t - \frac{R_{t-1}}{\pi_t}\right)$$

[4]See Chami et al. (2009) for more details.

[5]An increase in the exchange rate, $e_{t+1} > e_t$, however, has offsetting effects; it leads to an increase in the domestic currency value of foreign currency debt, which worsens sustainability. The ability of remittances to serve as a buffer against exchange rate shocks depends on many factors, including the source country of the remittance flows, the stability of those flows, the response of remittances to changes in the exchange rate, and the degree to which remittances augment the government's revenue base.

where b^c are the government bonds held by central bank and R_t denotes the foreign currency value of reserves. The central bank implements the following rule for the foreign currency value of reserves[6]:

$$R_t = \rho_R R_{t-1} + (1-\rho_R)\overline{R} + (1-\omega)(A_t - \overline{A})$$

As a small open economy, residents can borrow as much as they can without affecting the world interest rate. However, a risk premium is assessed based on the aggregate level of indebtedness of the economy. The interest rate is given by:

$$i_t = i^* + \psi_p\left(\exp(d_t - \overline{d}) - 1\right)$$

(The appendix provides FOC and definition of equilibrium in this model)

5.3.Calibration and Simulation Results

5.3.1. Calibration

For the research reported in this paper, the economy response is simulated under the effects of technology, government spending, terms of trade, foreign aid, remittances and FDI shocks. Statistics were computed by conducting simulations of 10,000 periods in length, taking logarithms, and filtering each simulated time series using the Hodrick-Prescott filter (Hodrick and Prescott, 1997).

For the parameters calibration is based partly on standard values found in the macro literature, and partly on desirable properties for the dynamics of the model.

Some parameters remain fixed from the start of calculations to address identification issues. Others, which can be linked to steady state values, are calibrated to roughly match the equilibrium. We set the government parameters to match the low fiscal efficiency of DCs. We assign the conventional values of 0.98 and 0.3 to the discount factor and the capital share in production, respectively.

[6]Berg et al. (2010) includes the exchange regime in this rule. Here we consider only the case of flexible exchange rate regime.

The share of employment in the production sector is 70%. We follow Gertler et al. (2007) and set the value for the share of raw home investment in the investment good composite, γi, at 0.5. Remittances expressed as a share of total output is 16% in steady state. Finally, we assume that the share of home-produced goods in household consumption, γh, is set to 0.4.

In this scenario, aid-related public investment is low efficient and the government deposits and reserve rules imply partial spending and partial absorption of aid.

Parameters	Value	Source
share of labor in production function	α= 0.70	
discount factor	β= 0.98	In standard range in literature
depreciation rate of capital	δ= 0.022	
adjustment cost parameter	ψ = 2.2	Acosta et al. (2009)
tax on labor income	τ= 0.33	
degree of home bias in consumption	γ_h=0.4	Berg et al. (2010) used 0.51 for Uganda
share of domestic investment in total investment	γ_i = 0.5	Gertler et al. (2007)
elasticity of substitution between local and foreign investment	ρ_i = 0.2	Acosta et al. (2009)
elasticity of substitution between home and imported goods	ρ_h= 0.3	Acosta et al. (2009)
share of private capital in total capital used in production	φ_q= 0.4	
depreciation rate of public capital	δ_g = 0.02	Berg et al. (2010) Arslanalp et al. (2010)
share of government spending on public investment	μ_s = 0.05	Low efficiency of public investment
public investment related to increase in aid	μ_A = 0.19	Policy parameter
tax on capital	τ_k = 0.02	
degree of persistence of increase in aid	ρ_A = 0.9	Berg et al. (2010)
deposit drawn down rate	ρ_d = 0.089	
degree of commitment to depreciation target in reserves	ρ_R = 0.9	
spending speed of aid	γ_A = 0.2	Partial spending policy
inverse of labor supply elasticity	φ = 2	
aid absorption	ω = 0.8	Partial absorption policy
degree of persistance of increase in remittances	ρ_{rem} = 0.078	Help match the steady state of Remittances 16%
degree of persistance of increase in foreign investment	ρ_{if} = 0.08	
degree of persistance of increase in central bank bonds	ρ_{bc} = 0.999	

5.3.2. Can development finance shocks account for the variance of output?

This section studies the optimal response to economic shocks using impulse responses. Starting at the stochastic steady state, the economy is subjected to an unexpected temporary shock, and the responses of consumption, output, trade balance, investment, the real wage and government spending are then plotted as a function of time.

Our theoretical and simulated moments show that our model predictions are conform to DCs stylized facts. One of the key stylized facts of developing economies business cycles is that consumption is substantially more volatile than output. Table 1 shows the relative standard deviations of consumption, investment, government spending and trade balance with respect to output. The model accurately predicts that both consumption and government spending are more volatile than output. Government spending is ten times more volatile than output.

Table 2 presents results of our variance decomposition analysis. The estimates suggest that the model attributes a significant share of business cycle fluctuations to foreign aid, remittances and FDI inflows.

Table 2: Conditional variance decomposition (in percent)

	Foreign aid	FDI	Remittances	Internal shocks
Output				
Q1	22.31	0.01	0.13	3.50
Q10	25.48	0.02	0.50	22
Trade balance				
Q1	10.51	0.01	6.83	60
Q10	34.11	0.01	2.65	54

As expected, domestic shocks can account for an important part of the output volatility. However, the results suggest that internal shocks are not the main factor driving fluctuations in real activity in developing countries. In the short-run, development finance shocks are the most important exogenous source of fluctuations (26 %). The results also confirm that remittances have an indirect impact on economy.

Figure 1 shows the responses to a foreign aid shock. The trade balance naturally depreciates as a result. However, the deterioration of the trade balance here does not necessarily translate into net foreign debt accumulation.

The short-run macroeconomic effect of the aid surge is driven by its impact on government spending. In response to the corresponding increased labor demand[7], there is a rapid increase in real wages in the short run, generating expansion in consumption and investment. This translates in a short-lived spike in real GDP. As well explained by Berg et al. (2010), the real exchange rate appreciation is important here. Because the expansion of consumption corresponds also to an increase of imports, the real appreciation contributes to an increase in the trade deficit[8].

As we can see the higher government spending related to the aid surge would not imply private investment crowding out. This result is supported by Berg et al. (2010) which demonstrate that an aid-recipient could avoid the crowding out of the private sector by combining partial spending and absorption policies. In this case, appreciation pressures can be diminished, ameliorating the short-term crowding out effect on private consumption and investment[9]. In our model the relative efficiency of public investment, or the share of spending allocated to public investment, is low, thus in the medium-run there is a decline in the real GDP effect.

Aid-recipient countries could address aid volatility on the fiscal side through expenditure smoothing accompanied by central bank foreign exchange sales that are limited to the amount of aid spent (Hussain et al. 2009).

[7]This expansion in non-traded output is partly satisfied by drawing labor from the traded sector. (Berg et al. 2010)

[8]We do not include the tradable-non-tradable sector discussion in our model. Berg et al. (2010) show that by making traded goods relatively cheaper, the real appreciation shifts private sector demand from non-traded to traded goods.

[9]The underlying cause of the private sector crowding out is the authorities' attempt to use the same aid resources twice: on the one hand, the central bank uses the foreign exchange value of aid inflows to build up reserves; on the other hand, the government uses the domestic currency counterpart to increase spending. Due to donors pressure some governments try to spend most of the aid; then accumulating aid flows in reserves created an excess of liquidity and, consequently, inflation pressures. Some central banks then decided to implement bond sterilization policies to counteract these pressures.

Fig. 2 reports the impulse response functions following a standard deviation shock to exogenous remittances. The increase in the household's disposable income results in a decrease in the amount of labor supplied. A shrinking labor supply is associated with relatively higher real wages. The household's income increases as a result of remittances and higher wages, which leads to an increase in consumption demand. An increase in households' consumption demand increases the demand for the home-produced good. This increase, along with the possibility of substituting relatively expensive labor with capital, positively affects investment demand. With shrinking labor supply and higher wages, the production which is labor intensive in DCs is negatively affected. Some studies affirmed that the productivity and the output would be negatively affected in the medium-run if the remittances are allocated to consumption and change household behavior against labor. These findings suggest that exogenous remittances, which are sizable and volatile, are a significant source of output fluctuation at shorter horizons[10].

We also present the reaction of the economy to FDI shocks (Figure 3). If the acquisition of a local firm by multinational corporation increases efficiency of the company compare to other domestic firms, it would require a more qualified human capital, generating a negative shocks in domestic labor demand in the short-run. Furthermore, in some DCs FDI inflows were an important component of privatizations and were therefore not new investments. The fact that corresponding cash were spent on consumption and imports could explain why there is the drop in investments after FDI shocks, and why even in the short run, there is a negative relationship between FDI and trade balance (Mencinger, 2003).

[10]Acosta et al. (2009) concluded that even if altruistically motivated or otherwise, an increase in remittances ultimately culminates in a rise in household income and, consequently, an increase in consumption that is biased toward nontradables.

5.4. Empirical Evidences

5.4.1. Panel VAR analysis

Section 2 (DSGE model) provides a comprehensive picture of the real exposition of DCs to external shocks and their impact on economic performance of developing countries, and of the relative importance of each type of shock. This section quantifies the impact of shocks in ECF for development on the output volatility of developing countries, and compares their relative ability to explain the large cyclical fluctuations observed in these countries vis-à-vis domestic shocks and other external shocks.

The preeminence of external shocks over domestic shocks is subject to debate. Mendoza (1991) and Kose and Riezman (2001), using calibrated small open economy models, find terms of trade shocks to account for almost half of economic fluctuations. Hoffmaister, Roldos, and Wickham (1998), Ahmed (2003), and Raddatz (2007), among others, using time-series analysis, find that external shocks explain a much smaller fraction of output volatility.

Nevertheless, we know that macroeconomic volatility is not only a source of business cycle uncertainty but also a major cause of low economic growth. Shock episodes were accompanied by a visible deterioration of the macroeconomic situation. For example, Crispolti and Tsibouris (2012) show that in presence of FDI shock, cumulative losses expressed as forgone GDP growth were approximately 0.2 percentage points of GDP growth in a year.

(1) Model specification

Following Love and Zicchino (2006), we directly estimate the output impact of economic shocks (domestic and external) using semi-structural vector autoregression analysis, as

applied to panel data of aggregate variables. This technique combines the traditional VAR approach, which treats all the variables in the system as endogenous, with the panel-data approach, which allows for unobserved individual heterogeneity. We specify a first order VAR model as follows:

$$z_{it} = \Gamma_0 + \Gamma_1 z_{it-1} + f_i + d_{ct} + \varepsilon_{it}$$

where $z_t = (y_t', x_t', i_t')'$, $y_t$is a vector of economic output; x_t is the vector of external shocks, included development finance shocks (aid, fdi and remittances), terms of trade and external demand shocks; i_t is a vector of domestic shocks (consumer price, private credit, exchange rate, interest rate, inflation, agriculture, manufacture and industry value added to gdp).

In our specification, we assume that current shocks have an effect on the contemporaneous value of output, while level of output has an effect on the level of aid, remittances and FDI only with a lag. We believe this assumption is plausible. For example in case of foreign aid, the allocation process is subject to informational time lags. Decision makers can only base their decisions on the information currently available, and for the most DCs, this information will, at best, be for the year prior to that for which the aid is allocated.

To implement the VAR, all variables must be in stationary forms. In the presence of non-stationary variables, a related problem is the possibility of finding spurious regressions. It is widely recognized that standard tests have very low power in front of the panel data (see Enders, 1995). This has led to the development of tests that seek to exploit the panel dimension of the data. Given the results of unit root tests (in Appendix) we cannot argued that all the variables can be characterized as stationary process, thus we will take in account potential non-stationarity in the model.

As explained by Love and Zicchino (2006) application of the VAR procedure to panel data impose that the underlying structure is the same for each cross-sectional unit. Since this constraint is likely to be violated in practice, they deal with this restriction by allowing for "individual heterogeneity" in the levels of the variables by introducing fixed effects. Since the fixed effects are correlated with the regressors due to lags of the dependent variable, they use forward mean-differencing, also referred to as the 'Helmert procedure' to eliminate fixed effects (see Arellano and Bover, 1995). This transformation preserves the orthogonality between transformed variables and lagged regressors, so we can use lagged regressors as instruments and estimate the coefficients by system GMM.

We then recover the impulse-response functions (IRF) to each of the structural shocks using these reduced form coefficients and the Cholesky decompositions of the corresponding variance–covariance matrices of errors. We estimate the contribution of each variable to the variance decomposition using their empirical variance, which is equivalent to assuming that the occurrence of a shock is a random variable that follows a Bernoulli distribution with the same probability across countries. The confidence bands for the IRF will be estimated by parametric bootstrapping assuming normally distributed reduced form errors.

We also present variance decompositions, which show the percent of the variation in one variable that is explained by the shock to another variable, accumulated over time. The variance decompositions show the magnitude of the total effect[11].

[11]To study the responsiveness of macroeconomic volatility to external shocks, we consider two measures of real external shocks, development finance related shocks and country-specific shocks, including terms of trade and external demand. External demand shocks are measured by shocks in trading partners' growth.

(2) Results

Our results here are close to those with DSGE simulation in section1. Foreign aid and Remittances shocks affect positively the output in the short-run (Figure 4). The finding about FDI supports the crowding out effect on private investment, which decreases the output. We also observe that the response of the output to terms of trade shocks is negative in the impulse responses, as expected. A shock to external demand increases the output, this effect will decrease rapidly if the production sector do not have unused capacity.

Given that the aim of this section is to quantify the impact of these development finance shocks and determine their contributions to output volatility in developing countries during last two decades, we rapidly move to variance decomposition analysis.

Table 3 shows the variance decomposition exercise for the forecast error of real per capita GDP with only domestic shocks, while Tables 4 and 5 progressively included external shocks in the specification. We follow this strategy in order to contribute to the debate about the preeminence of external shocks over domestic shocks and vice-versa. The tables show the fraction of the ten and twenty quarters year ahead forecast error that can be explained by all external shocks versus internal factors.

Internal shocks play an important role in the fluctuations of GDP, accounting for about 40 percent of the variance of output. The overall picture suggests that it is external factors the ones that account for most of the variance of real activity. We find that foreign aid, remittances and FDI shocks explain 25 to 60 percent of the output volatility.

Robustness: control for potential non-stationary process

As explained above, given that unit root tests presented contradictory results we need to consider non-stationarity being an issue here. Spurious regression result of apparent significance could occur in a regression model with non-stationary variables. Luckily, we can test the influence of non-stationarity to see whether the relationships estimated were spurious or not. In fact, if the significance of parameters does not disappear after performing a first difference-PVAR, we can be confident about the previous results. Table 7 presents GMM estimates of the response of output to shocks in a PVAR model with variables in level and in first difference. These results suggest that our findings are robust to potential non-stationarity. The overall results show that internal economic shocks can account only for a small fraction of the variance of the forecast error. Their relative importance, vis-à-vis external factors, increase with the forecast horizon, but in the full specifications they account at most for 35 percent of the total output variance. These findings suggest that development finance flows, supposed to help developing countries, are the most important factor driving fluctuations in real activity in developing countries[12].

5.4.2. Procyclical or counter-cyclical?

The last step of our analysis is to determine the nature of effect of each flow on business cycle.

(1) Empirical specification

The specification of the impact of foreign aid, FDI and remittance inflows on the DCs' business cycles is as follows:

$$\sigma_{i,t} = \alpha_1 A_{i,t} + \alpha_2 R_{i,t} + \alpha_3 F_{i,t} + X'_{i,t}\beta + u_i + f_t + \varepsilon_{i,t}$$

[12]Crispolti and Tsibouris (2012) show that shocks in foreign aid and FDI are more frequent than shocks in terms of trade and external demand in the last decades, thus our results are somehow highly expected.

where $\sigma_{i,t}$ is a measure of country's i business cycle (alternatively the magnitude and frequency of shocks) at year t . $A_{i,t}$, $F_{i,t}$ and $R_{i,t}$ are respectively the value of foreign aid, foreign direct investment and remittance inflows received by a country i at the year t expressed as a share of country's i GDP. X denotes the matrix of control variables, which includes household consumption, inflation, interest rate, credit to private sector as proxy of domestic financial depth, trade and financial openness[13], external demand and agriculture value added to gdp. u_i and f_t represent the country and year fixed effects, respectively, and ε_{it} is the idiosyncratic error term.

Following Calderon et al. (2007), business cycles are measured by taking the log deviation of the real GDP in each country with respect to its trend. The trend is computed using the Hodrik-Prescott filter. The smoothness parameter of the Hodrik-Prescott filter is set equal to 6.25, following Ravn and Uhlig's (2002) recommendation for annual data.

The financial openness variable for each country is drawn from the Chinn and Ito (2008) financial openness dataset. Higher values of the index refer to smaller capital account restrictions. The other variables are provided by World Development Indicators database over the period 1990-2010.

To correct for potential reverse causality, we follow Bruckner (2013) and apply a two-stage approach to uncover the relationship between foreign aid, remittances, FDI and business cycle in DCs.

[13] Following Barajas et al. (2012), we control for trade and financial openness to ensure that the coefficient associated with remittance inflows captures the direct effect, which does not work through the positive impact of remittances on these variables.

This twostep 2SLS estimation strategy enables to compute an estimate of the effects that development finance flows have on business cycle that are adjusted for the reverse causal effect that the business cycle variable has on these flows, while controlling their responses to economic conditions in the recipients' economies[14].

In the model, the endogeneity of development finance inflows is addressed by instrumenting variables with the residuals of this first stage regression:

$$Z_{1i,t} = \theta_1 Z_{2i,t} + X'_{i,t}\beta + \omega_{i,t}\,.$$

We chose to base our analysis here on OLS and 2SLS regressions despite the potential problems with the data because is a transparent way to look at the data without obfuscating the inherent mechanisms.

In this context of potential non-stationarity of some of the variables, as robustness checks, we choose to use the PMG (Pooled Mean Group) approach developed by Pesaran et al. (1999).In its generalised form, the PMG estimation can be represented by

$$\Delta y_{it} = \phi_i\left(y_{it} - \theta' X_{it}\right) + \sum_{j=1}^{p-1} \beta'_{ij}\,\Delta y_{i,t-j} + \sum_{j=1}^{p-1} \delta'_{ij}\,\Delta X_{i,t-j} + \sum_{j=1}^{p-1} \gamma'_{ij} Z_{i,t-j} + \mu_i + \varepsilon_{it}$$

The variable y is the ratio of primary interest (output volatility, skewness or kurtosis of GDP); X is a vector of non-stationary (I(1)) variables; Z is a vector of stationary (I(0)) variables;φ_i is the, country-specific, error-correction coefficient;μ is the, country-specific, intercept;θ is the vector of coefficients that define the long-run relationship,β, δ and$\gamma$are the country-specific short-run coefficient vectors, and ε are, stationary, country-specific vectors of standard errors. The term in brackets represents the (normalised) long-run, cointegrating relationship.

[14] See Brückner (2013) for the proof of the robustness of this two-step approach and the efficiency of the technique.

Besides providing an estimate of the long-run relationship between the non-stationary variables (within an error correction framework), the PMG estimator has several other advantages. By assuming common long-run coefficients across panels (countries) but allowing for differences in short-run and error-correction coefficients (as well as intercepts) across panels, this approach is less restrictive than fixed effects estimators that allow intercepts to vary but assumes common short-run and long-run coefficients as well as a common speed of error correction across panels.

The results are presented in Tables 7, 8, 9 and 10.

(2)Results interpretation

Foreign Aid : Stabilizing impact

The baseline specification includes a measure of the output cycle in recipient countries.

At the macroeconomic level, a major effect that can be expected from aid is due to its possible stabilizing impact. As expected, the foreign aid variable is negatively correlated with the volatility of the output in all the specification (Table 7).

We find that aid flows are on average counter-cyclical vis-à-vis the recipient cycle in the last two decades.

To document the stabilization property of aid, we test some channels suggested in the literature. First, income stabilization is an important component of aid impact. As explained in Guillaumont and Tapsoba (2012) we found that by making the resources available for national expenditure, aid stabilizes the output in recipients' countries. The results in Table 10 (column 1) suggested that when aid flows are directed toward public investment, its stabilizing impact on output fluctuations increases. Aid might also be used to finance higher levels of foreign

reserves and greater financial depth, which can then be used to cushion shocks to external income. The results in Table 10 (columns 2&3) indicate that the stabilizing impact of aid diminishes with the level of foreign reserves, and increasing when it serves financial development.The stabilizing impact of aid can also be captured through the quantity of net imports[15] financed by an increment in aid, which represents the real transfer of resources enabled by aid. Thus, aid should finance current account deficit in DCs (Column 4).

Furthermore, in column 5 the negative sign of the coefficient of the interaction term of aid and terms of trade shocks, as proxy of exposition to external shocks, suggested that foreign aid helps dampen external shocks effects. This finding confirms recent empirical findings in Guillaumont and Chauvet (2009) which suggested that aid may be more effective in vulnerable countries, and Dabla-Norris et al. (2010) which find that bilateral aid is countercyclical when aid recipients are hit by large adverse shocks.

Remittances: Counter-cyclical (stabilizing) but increase exposition to shocks

Now focusing on the impact of remittances on business cycle, estimation results present a negative correlation between remittances inflows and output volatility, confirming previous findings of Frankel (2011) and Ebeke (2011) which show that these flows have become more countercyclical in recent decades. This stabilizing effect works through two main channels: access to credit because it serves as substitute to credit market or as a collateral, and household consumption (Table 11).

If this empirical evidence justifies the importance given to remittances flows by policy makers, they should be aware that this potential positive effect could become smaller than the

[15]Both the direct and indirect increase in imports financed by aid, i.e. direct purchases of imports by the government, as well as second-round increases in net imports resulting from aid-driven increases in public or private expenditures

instability cost brought by remittances. Indeed as they increase business cycle synchronization with the rest of the world, they also increase the magnitude of shocks on output. In Table 9, we present estimation of the variables on the magnitude (skewness) and frequency (kurtosis) of shocks on output. The coefficient associated to the remittances variable is positively correlated to the exposure to shocks and negatively correlated to the incidence of these shocks on output.

Thus, DCs are more expose to external shocks than we were thinking, even countries with capital account restrictions and relatively few trade linkages. Barajas et al. (2012) suggested that these findings imply a revision of the concepts of openness and integration into the global economy.

Foreign direct investment: Increase output fluctuations…

The sign of the coefficients in the baseline specification (Table 7) and in the skewness regression (Table 9) shows that FDI increase the magnitude of shocks on output but the coefficient of the kurtosis regression suggests that it seems to reduce the frequencies of shocks. If FDI flows can provide a stimulus to domestic investment and innovation, it is possible that sudden changes in the volume of FDI inflows have a destabilizing impact on the economy. A second interpretation of the results is that the FDI flows gives a proxy for economic or political uncertainty; thus FDI volatility may give an indication of underlying instability (political and economic) in a country, and thus explain the procyclicity of FDI.

However, we know that some FDI inflows are linked to foreign aid received as explained before and thus there could be a part of FDI inflows that is countercyclical like aid flows. When we control for the share of FDI inflows related to growth rate in trading partners countries, the remaining FDI (tied to aid flows) seems countercyclical.

Results in table 12 show that when FDI flows are translate into increase in investment their destabilizing effect diminishes but if FDI receipts finance imports and consumption, the economy ends with a higher current account deficit and more volatile output.

Our regressions provide other interesting results internal factors driving fluctuations of output. Consumption is mainly driven, in the short run, by changes in expectations about permanent productivity. After a demand shock, as consumers temporarily overstate the economy's productive capacity, demand increases while productivity is unchanged. This generates inflation. This stabilizing property of inflation is reflected by the negative correlation with output volatility in Table 7. On the other hand after controlling for the external demand, the correlation became positive, suggesting that prices volatility increases macroeconomic volatility (last column Table 7).

The positive and statistically significant coefficient of the Agriculture Value added to GDP variable, shows that the size of agriculture sector in GDP increases the output volatility. Given that DCs are price takers, agriculture sector can make a country more vulnerable through the fluctuations in the prices of its main exports.

The financial depth has a positive effect on output volatility. This finding is consistent with the existing literature (Easterly et al. 2000; …). Our regression on kurtosis suggests that the financial depth also increase the frequency of shocks on output. Arcand et al. (2012) find that there is a positive relationship between the size of the financial system and economic growth, but too much finance could be associated with less growth.

5.5. Conclusion

The fundamental issue addressed in this paper is how development finance affects business cycles in developing countries (DCs). In particular, we explore the role of foreign aid, workers' remittances and foreign direct investment flows in the macroeconomic fluctuations faced by these economies. Indeed, beyond the opportunities offered by these flows they also induce macroeconomic challenges to recipient governments which could exacerbate the vulnerability of developing countries to external shocks.

In this paper, we experimented a simple real business cycle (RBC) model of small open economy with some characteristics of DCs. We accounted for their exposition to external capital flows like foreign aid, remittances and FDI, and represented how they influence the government, households and firms behaviors in recipient economies. Our preliminary outcomes suggest that our RBC model is consistent with some stylized facts of DCs business cycles: Consumption and Government spending are more volatile than output and a countercyclical trade balance.

The analysis of our theoretical model yields several results that are relevant to understanding the business cycles fluctuations in DCs. The response of the economy to foreign aid shocks depends on the government capacity to translate aid receipts into effective public investment. Moreover, to avoid the short-term crowding out effect on private investment, the government and central bank must follow partial spending and absorption policies as recommended by Berg et al. (2010).

Our results also confirm that remittances have only an indirect impact on output. If remittances, as expected have a positive impact on households' income and consumption, they could induce in the long run a decrease in labor supply and negatively affect the production. In the other hand, our findings show that the introduction of FDI in domestic firms is related

to an increase of the demand of highly qualified human capital, generally imported, and thus could correspond in the short-run to a negative shock in the demand of domestic labor.

The main contribution of this paper concerns the relative contribution of development finance flows shocks to macroeconomic fluctuations in DCs. We found that domestic shocks are not the main factor driving business cycles fluctuations in DCs. Our DSGE simulations show that foreign aid, FDI and remittances can account for twenty-six percent of output fluctuations. This finding suggests that contrary to the conclusions in Raddatz (2007), external shocks are responsible of an important fraction of the instability of output in low-income countries. In order to empirically document the findings of our theoretical model, we measured the role of these external flows using panel data on LICs and other developing economies during the period 1990-2008. We find that, even for countries like LICs with limited financial sector, when taking into account development finance flows (Foreign aid, FDI and remittances), they appear more expose to external shocks than expected. Panel VAR estimations show that internal factors can only explain thirty-five percent of the output instability in developing countries.

Finally, the results of the panel analysis help to describe the nature of each flow. First, as expected, FDI flows which are essentially capital movements, are procyclical to economic environment. Second, we find that during the last twenty years, aid flows were mostly counter-cyclical and this stabilizing property of aid works through revenue available for governments and increase in public investment. We also find that another significant component of aid impact in less developed countries is the financing of increase in the level of foreign reserves. Third, our empirical findings confirm recent studies about remittances showing that they are countercyclical. However, our results also show that dependence to remittances flows also increase the magnitude and the frequency of shocks on output as they increase business cycles synchronization with the rest of the world.

Our overall results can help to complete the analysis of macroeconomic vulnerabilities in developing countries (DCs) that arise from changes in the external environment. For example, the IMF implemented the Vulnerability Exercise for Developing Countries (VE-LIC) to provide to policy makers a systematic framework to "connect the dots" between vulnerabilities, potential tail risks in the global outlook, and their repercussions for countries. This program seeks helping DCs to manage volatility and mitigate external shocks; some findings of this paper could serve as contribution to this purpose.

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DSGE estimations

Table1: Volatility and Correlation with output

	Standard deviation		Correlation with output	
Output	1		1	
Trade balance	7.1		-0.27	
Consumption	3.2		0.65	
Investment	0.36		0.18	
Gov Spending	10.43		0.34	

Table2: Conditional Variance Decomposition

	Foreign aid	FDI	Remittances	Internal shocks
Output				
Q1	22.31	0.01	0.13	3.50
Q10	25.48	0.02	0.50	22
Trade balance				
Q1	10.51	0.01	6.83	60
Q10	34.11	0.01	2.65	54

PVAR Estimations

Table 3: Internal shocks

	Inflation (CPI)	Agri. value Added gr	Manufact. value Added gr	Financial sector	Interest rate
Output					
10	9.8	1.6	9.2	3.3	18
20	15.4	2.3	10	6	16

Table 4: Internal shocks vs development finance shocks

	Inflation (CPI)	Agri. value added	Manufact. value added	Industry Value	Foreign aid	Remittances	FDI
Output							
10	4	10	1.2	11	36	1.3	1
20	24	4.6	3	5.6	34	4	0.4

	Inflation	Financial sector	Interest rate	REER	Foreign aid	FDI	Remittances
Output							
10	0.95	2.7	1	0.3	17	36	6.2
20	1.2	8	0.52	0.7	25	31	9.7

Table 5: Internal vs external shocks

	Terms of trade	Agri. value added	Manufact. value added	Industry Value	Foreign aid	Remittances	FDI
Output							
10	3	3.3	14	9	41	2	1.5
20	2.4	5.1	12	19	34	1.9	1.6

	inflation	Financial sector	Demand from Partners	Terms of trade	Aid	Remittances	FDI
Output							
10	1.9	2.09	18	1.6	11	2.3	0.1
20	2.2	3	14	1.2	16	4	0.3
30	2.3	3.3	13	1.1	18.5	4.5	0.6

Table 6: Main results of a 4-variables VAR (Test of spurious regression: PVAR with potential non-stationarity)

Response of Output		PVAR		PVAR in first difference
Output (t-1)		1.27 (18.89)***		1.07 (24.75) ***
Foreign aid (t-1)		2.41 (3.82) ***		0.001 (4.81) ***
FDI (t-1)		-0.01 (-4.33) ***		-0.005 (-5.24) ***
Remittances (t-1)		0.016 (2.49) **		0.002 (1.05)

Four variables VAR model is estimated by GMM. Heteroskedasticity adjusted t-statistics are in parentheses. *** and ** indicates significance at 1% and 5% level, respectively. Reported numbers show the responses of output to shocks on lagged variables.

Panel IV estimations

Table 7 : Development finance impact on output volatility

	OLS (RE cluster- robust)	2SLS (IV-FE)
	Business Cycle (HP)	
Aid	-0.0066*** (0.00)	-0.05 *** (0.00)
Remittances	-0.00003** (0.049)	-0.002*** (0.00)
FDI	0.00004 *** (0.00)	0.0005*** (0.00)
Observations	2106 (127)	1380 (110)

	Dependent variable: Output volatility				
Aid	-0.11 *** (0.00)	-0.11*** (0.00)	-0.11 ***(0.00)	-0.044 *** (0.00)	-0.12*** (0.00)
Remittances	-0.0016 *** (0.00)	-0.0014***(0.00)	-0.0009** (0.03)	-0.0045 *** (0.00)	-0.0015 *** (0.00)
FDI	0.0004 *** (0.00)	0.00038 *** (0.00)	0.0006 *** (0.00)	-0.0032*** (0.00)	0.0006 *** (0.00)
Interest rate				-0.00003 * (0.08)	-0.00003* (0.05)
CPI	-0.0012 *** (0.00)	-0.002*** (0.00)	-0.0023*** (0.00)	0.0012* (0.07)	-0.002 *** (0.00)
Credit to private	0.00001 (0.41)	-0.00004 (0.99)	-0.00001 (0.18)	0.00012 ***	-0.000003 (0.80)
Financial openness	-0.00003 (0.83)	-0.000029 (0.83)	-0.000016 (0.9)	-0.000055 (0.68)	-0.000018 (0.89)
Investment (local)			-0.00016 ** (0.04)	0.002*** (0.00)	-0.00007 (0.41)
Public Investment	-0.0001 * (0.07)				
Agri.value added	0.0002*** (0.00)	0.00015 *** (0.00)	0.00017 *** (0.00)	0.00017*** (0.00)	0.00014*** (0.00)
Household cons.		0.00002 * (0.05)	0.00001* (0.05)	0.000022** (0.03)	0.00002** (0.04)
External demand				0.003*** (0.00)	
Observations	1041 (84)	1011 (80)	1011 (80)	1011 (80)	1011 (80)
R-sq	0.18	0.15	0.154	0.19	0.16

Table 8: PMG estimation (control for non-stationarity and cointegration)

	PMG	IV-PMG	PMG	IV-PMG
Short-run				
Aid	-0.027*** (0.00)	-0.25*** (0.00)	-0.017*** (0.00)	-0.53*** (0.00)
Remittances	-0.0002*** (0.00)	-0.002*** (0.00)	-0.00014 (0.13)	-0.018*** (0.00)
FDI	0.0003 (0.16)	0.0007*** (0.00)	-0.00006* (0.07)	0.0044 *** (0.00)
Error correction/ adjustment speed	0.77*** (0.00)	0.57 *** (0.00)	0.77 (0.00)	0.45*** (0.00)
Interest rate			-0.00002 (0.82)	-0.0004*** (0.00)
CPI			-0.0012 (0.21)	0.004*** (0.00)
Credit to private			-0.00003*** (0.00)	0.0003*** (0.00)
Financial openness			0.0005** (0.04)	-0.00033 (0.81)
Agri.value added			0.00001 (0.86)	-0.001*** (0.00)
Household cons			0.0009 (0.49)	0.0003*** (0.00)
cons	-0.0008***	-0.003(0.15)	-0.003* (0.07)	-0.01***
Long-run Normalized (corrected)				
Ec_AID	-0.011*** (0.00)	-0.028 (0.26)	-0.012* (0.07)	-0.13*** (0.00)
Ec_Remit	-0.0006* (0.07)	-0.001 (0.11)	-0.0001 (0.80)	-0.0022*** (0.00)
Ec_FDI	-0.00001 (0.8)	0.0004** (0.03)	-0.00002 (0.53)	0.0009*** (0.00)

The PMGestimates are presented as a two-equation model: the normalized cointegrating vector and the short-run dynamic coefficients, with robust-standard errors.
Panel-specific intercepts are allowed.
Output on normalized estimates of the other variables are not display but available upon request.

Table 9: Development finance shocks on magnitude and frequency of shocks on output

	Skewness	Kurtosis	Skewness	Kurtosis
Aid	-3.08*** (0.00)	1.80*** (0.00)	0.55 (0.75)	-0.08 (0.90)
Remittances	0.056 ** (0.02)	-0.02 ** (0.023)	0.29 *** (0.00)	-0.12*** (0.00)
FDI	-0.01 (0.15)	0.004 (0.14)	0.20 *** (0.00)	-0.09 *** (0.00)
Interest rate			-0.00005 (0.97)	0.00004 (0.93)
CPI			0.02 (0.75)	-0.017 (0.54)
Credit to private			-0.01*** (0.00)	0.004*** (0.00)
Financial openness			-0.11*** (0.00)	0.045*** (0.00)
Agri.value added			-0.007 (0.22)	0.003 (0.13)
Household cons.			0.0009 (0.49)	-0.0003 (0.57)
External demand			-0.11 * (0.05)	0.042** (0.04)
Observations	1380 (110)	1380 (110)	1011 (80)	1011 (80)
R-sq	0.062	0.10	0.155	0.21

Regressions here follow the same 2SLS specification used in Table 7, with dependent variables being the skewness and Kurtosis of GDP.

Table 10: Foreign aid transmission channels

	1	2	3	4	5
Aid	-0.12***	-0.047***	-0.11 ***	-0.11***	-0.07***
Aidxpublic invest	-0.0008** (0.04)				
AidxResevres		0.017 (0.26)			
AidxCredit			-0.0002** (0.01)		
AidxCA				0.00084***	
AidxTOT shocks					-0.00005 (0.22)
Remittances	-0.004***	-0.0019***	-0.0016***	-0.0014 ***	-0.002 ***
FDI	0.0007***	0.0005***	0.0006 ***	0.0006***	0.0005***
Interest rate	-0.00007***		-0.0003** (0.04)	-0.00003** (0.03)	
CPI	-0.0013***		-0.002***	-0.002***	
Credit to private	0.00005** (0.01)		-9.17e-07 (0.94)		
Financial openness	0.0001 (0.56)		-0.00004 (0.77)	-0.00003 (0.84)	
Agri.value added	0.0001 (0.85)		0.00012** (0.02)	0.00016***	
Household cons	0.00002* (0.08)		0.00002* (0.05)	0.00002* (0.088)	
Public investment	0.00004 (0.5)				
Current account				-0.00008***	
Foreign reserves		-0.00045* (0.07)			
External demand					
Terms of trade shocks					0.0000003* (0.08)
Observations	790	1363	1037	1011	1069
R-sq	0.189	0.06	0.14	0.173	0.091

Regressions here follow the same 2SLS specification used in Table 7.

Table 11: Remittances transmission channels

	1	2
Remittances	-0.0025***	-0.0007 * (0.06)
RemitxCredit	0.0007***	
RemitxHousehold		-0.000015***
Aid	-0.11***	-0.11***
FDI	0.0007***	0.0006***
Interest rate	-0.00003** (0.03)	-0.000034** (0.02)
CPI	-0.002***	-0.0019***
Credit to private	-0.0001***	-1.9e-06 (0.8)
Financial openness	-0.000016 (0.90)	-0.00001 (0.94)
Agri.value added	0.00005 (0.34)	0.0001** (0.04)
Household Exp.	0.00002** (0.04)	0.00005* (0.07)
Observations	1011	1011
R-sq	0.185	0.17

Regressions here follow the same 2SLS specification used in Table 7

Table 12: FDI transmission channels

	1	2	3
Aid	-0.11***	-0.12***	-0.117***
Remittances	-0.0015***	-0.0014***	-0.0016***
FDI	0.00067***	0.00066***	0.0003** (0.04)
FDIxInvestment	-3.06e-06* (0.05)		
FDIxICurrent account		0.00008***	
FDIxndustry			0.00001 ***
Investment	-0.0004 (0.66)	-0.0001 (0.31)	-0.0001 (0.28)
Interest rate	-0.00003* (0.06)	-0.00003** (0.02)	-0.00004***
CPI	-0.002***	-0.0021***	-0.002***
Credit to private	-0.00003 (0.78)	-0.00006 (0.63)	-0.000045 (0.73)
Financial openness	-0.00002 (0.88)	-0.00007 (0.63)	-0.00008 (0.53)
Agri.value added	0.00015***	0.00015***	0.0001** (0.04)
Industry value added			-0.00005* (0.07)
Household cons.	0.00002* (0.054)	0.00002* (0.05)	0.000024** (0.02)
Current account balance		-0.0001***	
Observations	1011	1011	1011
R-sq	0.161	0.184	0.178

Regressions here follow the same 2SLS specification used in Table 7

Graphics and Figures:

Figure 1: IRFs to foreign aid shocks

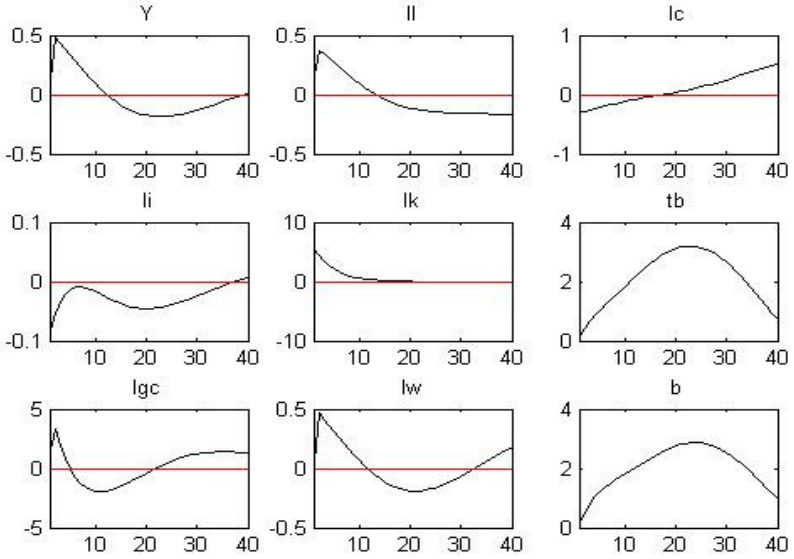


Figure 2: IRFs to Remittances shocks

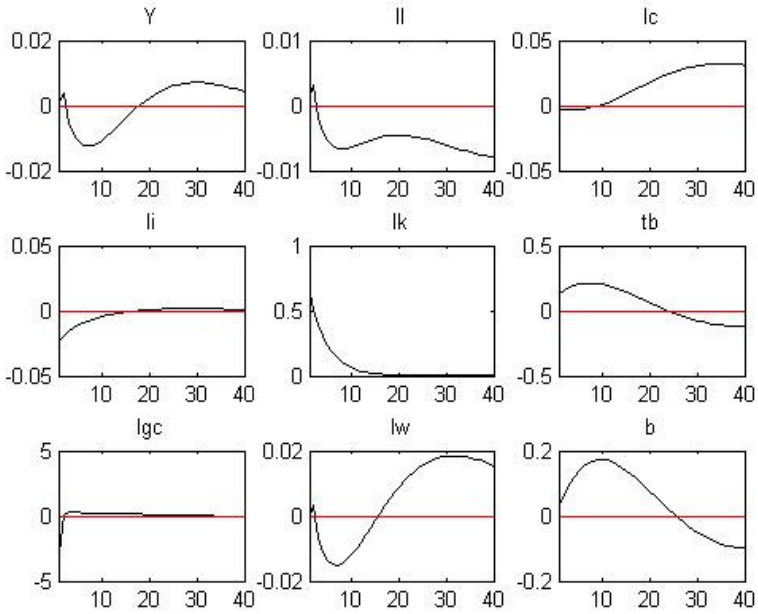


Figure 3: IRFs to foreign direct investment shocks

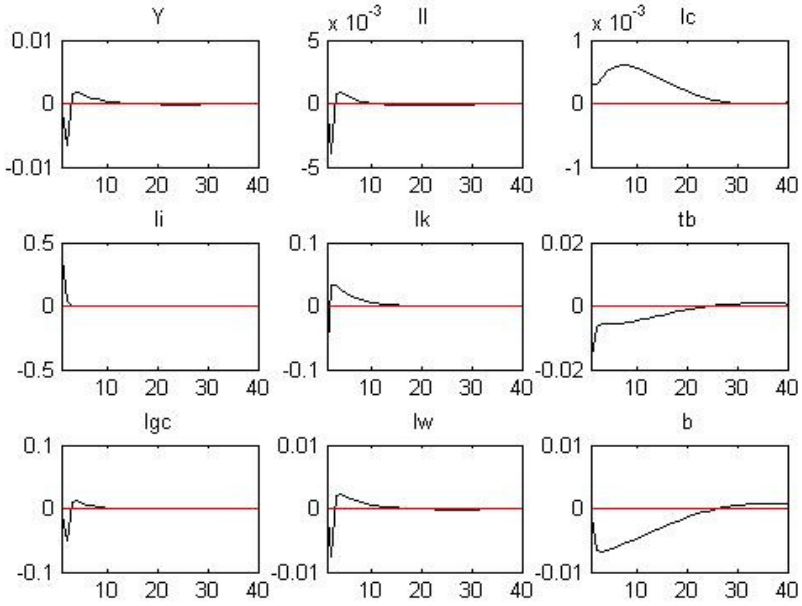
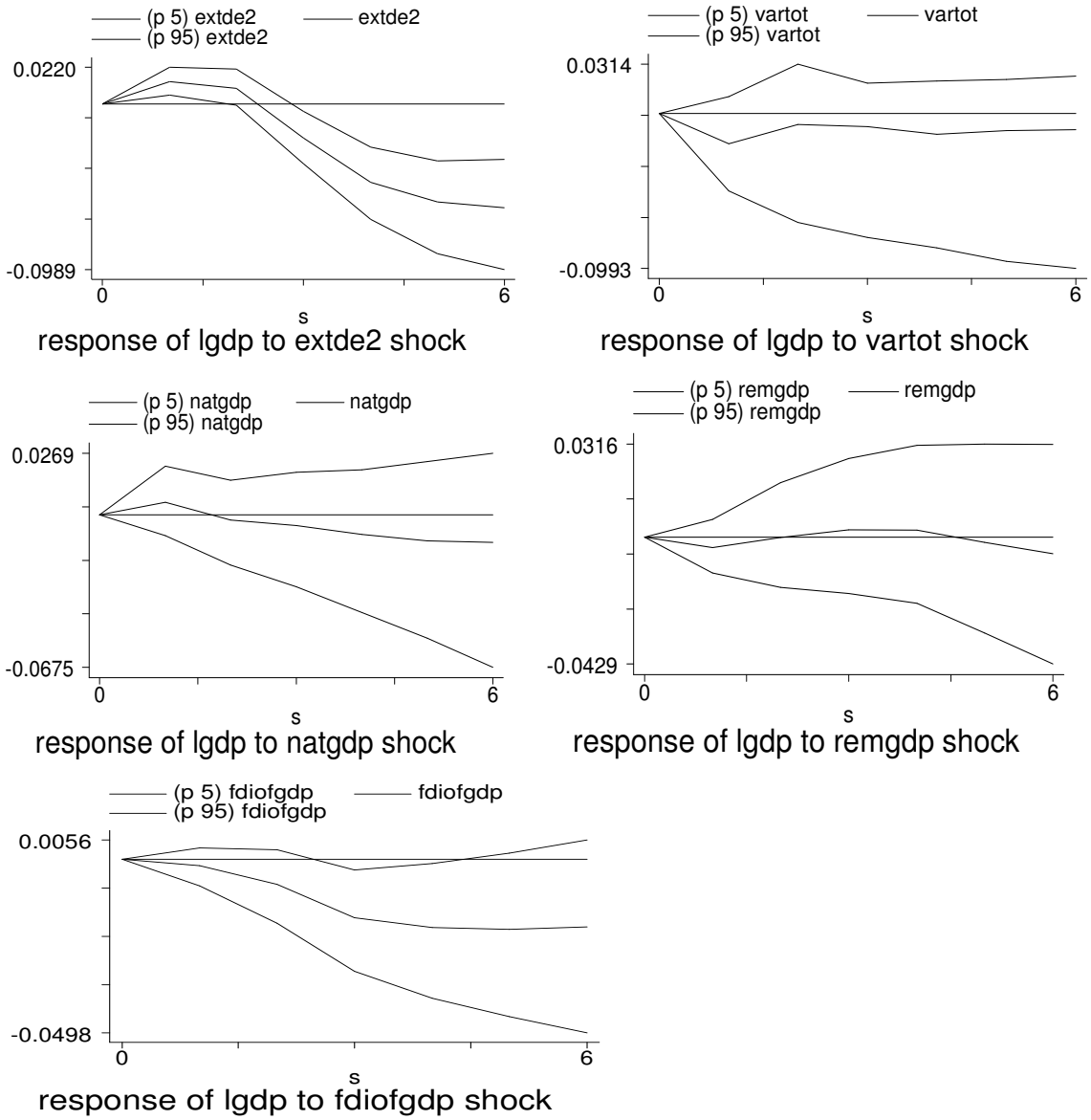


Figure 4: IRFs from Panel VAR analysis



Appendix A. Tests and Data description

Unit Root and Cointegration tests:

Maddala and Wu (1999) Fisher Test				
lags	Output volatility	Aid	Remittances	FDI
	Specification without trend			
0	1713.41 (0.00)	639.69 (0.00)	756.29 (0.00)	904.18 (0.00)
1	1615.70 (0.00)	315.73 (0.10)	524.36 (0.00)	491.85 (0.00)
	Specification with trend			
0	1168.32 (0.00)	651.90 (0.00)	825.65 (0.00)	859.01 (0.00)
1	1068.74 (0.00)	326.81 (0.05)	455.29 (0.00)	482.14 (0.00)

Panel Unit Root Tests
chi_sqin cells and p-value in parenthesis

Pesaran (2007) CIPS Test				
lags	Output volatility	Aid	Remittances	FDI
	Specification without trend			
0	-23.82 (0.00)	-12.66 (0.00)	-20.34 (0.00)	-12.42 (0.00)
1	-21.31 (0.00)	-4.17 (0.00)	-13.31 (0.00)	-2.58 (0.005)
	Specification with trend			
0	-16.65 (0.00)	-12.57 (0.00)	-14.54 (0.00)	-7.28 (0.00)
1	-12.22 (0.00)	-1.01 (0.15)	-10.78 (0.00)	2.20 (0.98)

Zt-bar p-value

Null hypothesis for MW and CIPS tests: series is I(1).MW test assumes cross-section independence.CIPS test assumes cross-section dependence is in form of a single unobserved common factor.

Appendix B. Optimality Conditions and Exogenous shocks equations

Households:

$$\beta E_t\left[\left(\frac{i_t}{\pi_{t+1}}\right)\frac{1}{C_{t+1}}\right]=\frac{1}{C_t}$$

$$(l_t)^{\varphi}=\left(\frac{1}{C_t}\right)\times(1-\tau)w_t$$

$$(1-\tau)w_t l_t+i_{t-1}\times\frac{b_{t-1}^h}{\pi_t}+s_t REM_t-C_t-b_t^h=0$$

Production Unit:

$$Y_t=a_t\left(K_t^{\phi}q_t^{1-\phi}\right)^{1-\alpha}l_t^{\alpha}$$

$$E_t\Omega_{t+1}\left((1-\alpha)\frac{Y_{t+1}}{K_{t+1}}-P_{I,t+1}\left[\frac{\psi}{2}\left(\frac{I_{t+1}}{K_{t+1}}-\delta\right)^2-\psi\left(\frac{I_{t+1}}{K_{t+1}}-\delta\right)\frac{I_{t+1}}{K_{t+1}}\right]+\lambda_{I,t+1}(1-\delta)\right)=\lambda_{I,t}$$

$$P_{I,t}\left(1+\psi\left(\frac{I_t}{K_t}-\delta\right)\right)=\lambda_{I,t}$$

$$W_t=\alpha\frac{Y_t}{L_t}$$

$$K_{t+1}=I_t+(1-\delta)K_t$$

Investment Unit:

$$I_{H,t}=\gamma_i\left(\frac{1}{P_{I,t}}\right)^{-\rho_i}I_t$$

$$I_{F,t}=(1-\gamma_i)\left(\frac{P_{IF,t}}{P_{I,t}}\right)^{-\rho_i}I_t$$

$$P_{I,t}=\left[\gamma_i+(1-\gamma_i)P_{IF,t}^{\,1-\rho_i}\right]^{\frac{1}{1-\rho_i}}$$

-Exportation sector

$$C_{w,t}=\left[\gamma_x^{\frac{1}{\rho_x}}(X_t)^{\frac{\rho_x-1}{\rho_x}}+(1-\gamma_x)^{\frac{1}{\rho_x}}(C_{f,t})^{\frac{\rho_x-1}{\rho_x}}\right]^{\frac{\rho_x}{\rho_x-1}}$$

$$X_t=\gamma_x\left(\frac{P_{h,t}}{s_t P_{M,t}}\right)^{-\rho_x}C_{w,t}$$

Government and Central bank:

- Public Investment

$$q_t=(1-\delta_g)q_{t-1}+\mu_s\bar{g}+\mu_A(g_t-\bar{g})$$

- Government constraint

$$g_t = \tau w_t l_t + \tau_k K_t + s_t A_t - \left(d_t - \frac{d_{t-1}}{\pi_t} \right) - \frac{i_{t-1} - 1}{\pi_t} b_{t-1}^c + \left(b_t - \frac{b_{t-1}}{\pi_t} \right)$$

$$b_t = b_t^h + b_t^c$$

- Evolution of domestic bonds

$$b_{t+1}^h = \frac{(1+i_t)}{(1+\pi_t)(1+G)} \frac{\eta_t}{\eta_{t+1}} b_t^h - \left((\tau w_t l_t + \tau_k K_t) - g_t \right)$$

$$\eta_t = 1 + \left(REM_t s_t \right) \Big/ Y_t$$

- Accumulation of government deposit

$$d_t = \rho_d d_{t-1} + (1-\rho_d)\bar{d} + (1-\gamma_A) s_t \left(A_t - \bar{A} \right)$$

- Central Bank Sheet

$$b_t^c - \frac{b_{t-1}^c}{\pi_t} = \left(d_t - \frac{d_{t-1}}{\pi_t} \right) - s_t \left(R_t - \frac{R_{t-1}}{\pi_t} \right)$$

-Central Bank Reserves rule

$$R_t = \rho_R R_{t-1} + (1-\rho_R)\bar{R} + (1-\omega)\left(A_t - \bar{A} \right)$$

- Interest rate

$$i_t = i^* + \psi\left(\exp\left(d_t - \bar{d} \right) - 1 \right)$$

Exogenous processes introduced to the dynamic stochastic general equilibrium model

- Evolution of foreign aid

$$A_t = \bar{A} + \rho_A \left(A_{t-1} - \bar{A} \right) + \varepsilon_t^A$$

- Remittances

$$REM_t = \overline{REM} + \rho_{re} \left(REM_{t-1} - \overline{REM} \right) + \varepsilon_t^{re}$$

- Foreign Investment

$$I_{f,t} = \bar{I}_f + \rho_{if} \left(I_{f,t-1} - \bar{I}_f \right) + \varepsilon_t^{if}$$

- Central bank bonds

$$b_t^c = \bar{b}^c + \rho_{bc} \left(b_{t-1}^c - \bar{b}^c \right) + \varepsilon_t^{bc}$$

- Productivity shocks

$$a_t = \bar{a} + \rho_a \left(a_{t-1} - \bar{a} \right) + \varepsilon_t^a$$

- Terms of trade shocks

$$Tot_t = \frac{P_{h,t}}{s_t P_{M,t}} \quad \ln Tot_t = (1-\rho_{tot}) \ln Tot + \rho_{tot} \ln Tot_{t-1} + \varepsilon_t^{tot} + \mu_{tot} \varepsilon_{t-1}^{tot}$$

;

Chapter 6. The Impact of Being an LDC Member

Abstract:

The paper studies the impact of being categorised as a Least Developed Country (LDC) by using matching methods for parametric and non-parametric estimations. Our results suggest that LDC status has a positive and statistically significant impact on the growth rate of Gross domestic product per capita. Our findings also suggest that the least developed countries respond better to external shocks and are less vulnerable prior to the support measures linked to the LDC status.

JEL code : C14, C31, C33, F35, O11

Keywords: Least Developed Countries, Macroeconomic Vulnerability, Economic Growth, Treatment effect, Matching, Non-parametric preprocessing, Sensitivity analysis

6.1. Introduction

The "Least developed countries" (LDCs) are defined as being among the poorest countries in the world; and as suffering from severe structural handicaps to their development viz: lack of human capital and a high vulnerability to natural and external shocks. Table 1 briefly compares some characteristics of LDCs with those of other Low Income Countries (LICs). They are weak and vulnerable.

[HereTable1]

The official recognition in 1971 of this special category of developing country represented an exception in the history of the UN system (Guillaumont, 2009). The structural characteristics of LDCs dampen their economic development and make them more likely to remain caught in the poverty trap. Because of that, they have benefited from special treatment from the international community since 1971; such as special support measures from the donor community, including bilateral donors and multilateral organizations, as well as special treatment accorded by multilateral and regional trade agreements. Currently, the major LDC support measures vary depending on development partners. These support measures primarily relate to trade preferences and to the amount of Official Development Assistance (ODA), but they also include various other special treatments provided by multilateral institutions; in particular by the UN and the World Trade Organization (WTO) (UNDP, 2008). The main measures related to international trade are preferential market access, special treatment regarding WTO obligations, and trade-related capacity building. As regards the ODA, as well as the old target of ODA of developed countries reaching 0.7 per cent of their GNI, an additional target of 0.15 per cent for the ratio of their ODA specifically allocated to LDCs was adopted at the first UN Conference on LDCs in 1981. Some other measures consist of direct support aimed at facilitating their participation in the UN system, and thereby to empower them within the system.

This paper proposes an analysisof the evolution of countries identified as LDCs with the objective of finding a better understanding of the impact of the special support measures related to this country category. Instead of taking an evaluation measure by measure, this paper chooses to find the average impact of the LDC status on economic growth and macroeconomic vulnerability. To permit this approach we need a control group that can be compared to LDCs - a group of comparable countries, but countries which do not benefit from LDC status.

A recent note by Arcand et al (2012) showed that the status of LDCs had no significant effect on economic growth of such countries[1]. The method used in that work is the Regression Discontinuity Design which determines the "local average effect" by simulating a pseudo-randomization around the threshold of identification[2]. However, results from these estimates are difficult to generalise in case of LDC identification, especially if countries around the threshold are not representative of the entire sample[3]. Here we want to go further the only growth effect and see if LDCs are less vulnerable after their inclusion.So this analysis covers economic growth, volatility of output and volatility of exports in LDCs.

[1] Due to the structural break in the LDC criteria, they split the sample into two periods: 1971 to 1990 and 1991 to 2008.

[2] Intuitively speaking, RDD is akin to a local randomization and allows looking for the difference between members and non-members who are at the border of the criteria thresholds (just below and just above). But history of LDCs shows that identification the criteria were sometimes violated, to take that into account we have three choices: (i)Before the Study: Talk to those who can might override assignment (administrators)
– Identify their concerns.
– If those concerns can be clearly articulated and uniformly implemented, then they can be made into exclusion criteria for getting into the study
(ii)Designing the Study: Combine RDD with a randomized or nonrandomized experiment, using two cutoffs with random (or nonrandom) assignment occurring in the interval that will be fuzzy (method used in Arcand et al. 2012)
(iii) Intent-to-Treat: In a randomized experiment, it is standard to analyze the data according to how people were assigned, not according to which treatment they actually received. This preserves the internal validity of the design. (We apply this method in the Heckman selection model)

[3] Extend the results to countries far away from these thresholds should be done with caution.

Our empirical strategy is based on the specificity of the LDCs' history and variations of identification criteria over time. These issues about the identification of LDCs allow us to have ex-post a kind of randomisation in the selection process that is useful for our analysis[4].

We use two applications of matching methods to perform our empirical analysis of themacroeconomicimpact of being an LDC. First, we apply the Abadie and Imbens (2007) nearest neighbor-matching estimator on a small group of comparable countries identified by Guillaumont (2009), called "discordant" countries. This is a group of similar (in term of some observable characteristics related to structural features) low-income countries with different evolution: some became LDCs and other did not. Second, following Ho et al. (2007) we use matching to pre-process a dataset of 120 developing countries to generate a control group to assess the impact of LDC status on countries' economic growth and macroeconomic volatility. Then, we apply the parametric estimation methods on the matched data, with the aim of producing robust causal effect estimates with low bias and variance.

Applying the nearest neighbor matching method to the discordant dataset, we reach the conclusion that LDC membership has positive and significant economic growth effects and reduces the vulnerability to shocks. We perform two robustness analyses: simulation-based sensitivity analysis (Ichino et al 2007) and the Altonji et al. (2005) procedure to assess bias from unobservables. Both analyses confirm that there is no reason to reject our findings. As an alternative, pre-processing matching proposes an analysis with more observations and less assumptions. Parametric models (Random effect, Fixed effect and Heckman selection models) applied to the pre-processed dataset produce less model-dependent causal inferences, and confirm a positive effect of LDC status.

[4]Ex-post randomization will be done using the retrospective's HAI and EVI that allow to have the values of these criteria for the periods preceding their creation. Thus, our assessment will be done uniformly throughout the period 1971-2008 with the criteria adopted since 2006.

The structure of this paper is as follows: Section 2 presents a model to explain the implications of LDCs support measures. Section 3 describes the empirical issues related to the identification of the impact of LDC membership. Section 4 explains the adopted empirical strategies to measure the causal effect of the special measures package for LDCs. Section 5 presents data and results. Section 5 offers conclusions.

6.2. Modelling LDCs Measures Effects

To understand support measures to LDCs we choose to theorize that in a small open economy.

A) The Model

1. Households

The economy is inhabited by a representative agent who maximizes the expected value of lifetime utility as given by:

$$E_0 \sum_{t=0}^{\infty} \beta^t \left[\log(C_t) - \frac{1}{1+\varphi} (L_t)^{1+\varphi} \right]$$

where C_t and L_t represent period t consumption index and labor. The household's composite consumption index C_t is a nested constant elasticity of substitution (CES), which combines the household's consumption of domestically produced goods $C_{h,t}$ and imported goods $C_{M,t}$:

$$C_t = \left[\gamma_h^{\frac{1}{\rho_h}} (C_{h,t})^{\frac{\rho_h - 1}{\rho_h}} + (1-\gamma_h)^{\frac{1}{\rho_h}} (C_{M,t})^{\frac{\rho_h - 1}{\rho_h}} \right]^{\frac{\rho_h}{\rho_h - 1}}$$, where γ_h is consumption of home goods bias and ρ_h elasticity of substitution between imported and domestically produced goods.

The consumer price index is: $P_t = \left[\gamma_h (P_{h,t})^{1-\rho_h} + (1-\gamma_h)(P_{M,t})^{1-\rho_h} \right]^{\frac{1}{1-\rho_h}}$.

The maximization is done subject to the budget constraint:

$$\left(\eta_1 (1+\tau_m)(1+\tau_{cm}) + \eta_2 (1+\tau_{ch}) p\right) C_t + b_t^h = (1-\tau) w_t L_t + i_{t-1} \frac{b_{t-1}^h}{\pi_t} + s_t REM_t + F$$

where $\eta_1 = (1-\gamma_h)\left(\frac{P_M}{P}\right)^{-\rho_h}$ and $\eta_2 = (\gamma_h)\left(\frac{P_h}{P}\right)^{-\rho_h}$, REM are remittances received, s is exchange rate, b_h households bonds to government, I interest rate , π is inflation and F is a lump sum transfer from government to households.

2. Firms

-Production unit

The production unit produces goods according to the following function:

$Y_t = a_t \left[K_t^{\phi} q_{t-1}^{1-\phi} \right]^{1-\alpha} (L_t)^{\alpha}$ where a_t is an exogenous productivity shock in production, φis share of private capital in production function, α is share of labor and q_t is public capital. The investment satisfies the standard law of motion for capital:

$K_{t+1} = (1-\delta)K_t + I_t$, where δ is the depreciation rate of the capital stock and I_t is investment.

-Exportation sector

Producers export domestically produced goods on foreign competitive goods markets at an exogenous price since the small open economy is price taker. Domestically produced goods are purchased by foreign households. We assume that foreign households' aggregate consumption is described by a CES function that combines home produced and import goods as following:

$$C_{w,t} = \left[\gamma_x^{\frac{1}{\rho_x}} (X_t)^{\frac{\rho_x - 1}{\rho_x}} + (1-\gamma_x)^{\frac{1}{\rho_x}} (C_{M,t})^{\frac{\rho_x - 1}{\rho_x}} \right]^{\frac{\rho_x}{\rho_x - 1}}$$

where γ_x is the share of the home economy's exports in the rest of the world consumption index and ρ_x is the elasticity of substitution between the home economy's exports and the foreign produced goods.

The export demand is given by the relation

$$X_t = \gamma_x \left(\frac{P_{h,t}}{s_t P_{M,t}} \right)^{-\rho_x} C_{w,t}$$

The rest of the world's aggregate consumption $C_{w,t}$ is exogenous for the economy and its path is assumed to evolve along a stochastic log-linear autoregressive process given.

-Profits of firms

The profits of the importable goods sector are determined by:

$\pi_M = (1+\tau_m)Y_m - (1+\tau_m)(1+\tau_{cn})k_m$.

The profits of the exportable goods sector are determined by:

$\pi_X = (1-\tau_x)\left(\frac{P_{h,t}}{s_t P_{M,t}}\right)Y_X - (1+\tau_m)(1+\tau_{cn})k_x$, where $\tau_x$is an export tax levied by the rest of the world, k_m (k_x) is the amount of capital demand by the importable sector (exportable).

3. The Government

We assume that government satisfies the following constraints:

$$q_t = (1-\delta_g)q_{t-1} + \mu_s \bar{g} + \mu_A(g_t - \bar{g})$$

$$g_t + F = \tau w_t L_t + \tau_k K_t + \tau_{cn} C_{h,t} p_t + \tau_{cm}(1+\tau_m)C_{M,t} + s_t A_t - \left(\frac{i_{t-1}-1}{\pi_t}\right)b_{t-1}^h$$

δ_g depreciation rate of public capital, μ_s efficiency of public investment in steady state, μ_A efficiency of aid related public investment, with $A_t = \overline{A} + \rho_A(A_{t-1} - \overline{A}) + \varepsilon_t^A$.

B) Effects of LDCs measures

Support measures to LDCs are related to trade preferences and foreign aid surge. If an aid surge and its macroeconomic implications for government budget and the economy appear clearly in our model (see Berg et al. 2010), the impact of trade agreements and other trade related measures require more explanations. These measures would imply for example:

- decreasing of the export tax: an LDC would have an increased market access;

- reducing of imports tariffs;

- with low transactions costs trade agreements would attract long-term risk-sharing investment flows.

Although traditional focus on commercial policy at the border, these measures imply structural reforms and policy change. For example, the implementations of the schedules for gradual tariffs reduction on different goods and services would impose additional roles to the country administration. Moreover, quality standards, as well as measures specific to the services sector, laws related to property rights, reforms of stated-owned industries etc… will enhance competitiveness and long-run growth. Because of their nature trade agreements are expected to produce gradual changes in the variables that intend to capture them. The structure of the economy also determines the speed of the transition.

The whole set of measures related to LDC status represent a supply of possible benefits. Their inventory is required as a starting point but it does not inform on how they are used. For each of them, the real benefit for a LDC depend on (i) whether the measure has been actually used by the country, (ii) whether this use has been a real advantage and (iii) how the measure has been implemented.

The measures linked to the category should not only enhance growth but also reduce the macroeconomic vulnerability of the LDCs.

6.3. Empirical Difficulties: How to Identify the Impact of the Status

6.3.1. Definition of LDC

To understand the methodological difficulties faced by this analysis, one has to appreciate the process of categorising countries as *least developed*.

The United Nations (UN) Committee for Development Policy (CDP) defines the category of the LDCs as comprising those LICs suffering from structural handicaps to economic development, and suffering from a high level of economic vulnerability. At present identification of LDCs is related to pre-determined threshold values of three main criteria: GNI per capita (GNIpc), Human Assets Index (HAI) and Economic Vulnerability Index

(EVI). There is an additional condition – that of a population less than 75 million, the idea being that larger populations have an advantage in terms of the potential supply of human capital, as well as offering potentially larger domestic markets. The triennial review of the list of LDCs begins with an analysis of the economic and social conditions in all Low Income Countries by an expert group consisting of CDP members. Today, to be added to the category, a country must satisfy the inclusion threshold levels in respect of all three criteria. A country will be eligible for graduation from LDC status when it no longer meets the graduation thresholds for two of the criteria, or when its GNI per capita exceeds at least twice the graduation threshold and with a high likelihood that the level will remain sustainable. (Handbook on the LDC category, 2008)

Before 1991 and the UN reform[5] , most of the new LDCs were included because of a degradation in their situation, measured essentially in per capita GDP growth. After 1991, countries were included because of degradation in their situation measured by two other criteria: economic diversification and physical quality of life. Since 2000, these criteria have been replaced by economic vulnerability and lack of human resources[6]. The asymmetry between inclusion and graduation criteria is also important to understand how LDCs are identified:

- Thresholds for graduation are established at a higher level than those for inclusion;
- In order to be eligible for graduation, a country must cease to meet not just one, but two out of the three inclusion criteria;

[5]The Committee has furthermore always stressed the importance of maintaining stability in the criteria, and in the application of the established procedures, so as to ensure the credibility of the process, and consequently, of the list itself. In this regard, the Committee, in establishing which indicators to use, selected those which proved to be sufficiently stable over time to minimize the likelihood of easy reversibility of status from LDC to non-LDC and vice versa.

[6]More details on components and criteria evolution in the appendix.

- Eligibility for inclusion is ascertained once, whereas eligibility for graduation has to be observed over two consecutive triennial reviews.

Guillaumont (2009) provides an analysis of implications and consequences of this asymmetry on the identification of LDCs, and explores possibilities for reforming LDC inclusion and graduation criteria.

Table 2 - Criteria for developing countries to be eligible for inclusion on the LDC list, 1971-2009

1971–90	1991–97
Meet three criteria [a]: • Per capita GDP is below a threshold adjusted according to world growth. • Literacy rate is 20% or lower. • Share of manufacturing value added in the GDP is 10% or lower. or (since 1981) Meet two criteria: • Per capita GDP is below a lower threshold. • Share of manufacturing value added in the GDP is 10% or lower.	Meet four criteria : • Population is 75 million or less. • Per capita GDP is below a threshold. • Augmented physical quality of life index value is below a threshold. • Economic diversification index value is below a threshold. If the augmented physical quality of life index or economic diversification index criterion is not met, other qualitative elements may be considered.
2000	**2003–09**
Meet four criteria: • Population is 75million or less. • Per capita GDP is below a threshold. • Augmented physical quality of life index value is below a threshold. • Economic vulnerability index value is above a threshold. If the country is near the threshold for any criterion other than population size, a vulnerability profile is to be taken into consideration.	Meet four criteria : • Population is 75 million or less. • Per capita GNI is below a threshold. • Human assets index value is below a threshold. • Economic vulnerability index value is above a threshold.

Source: Guillaumont (2009): *Caught in a trap: identifying the least developed countries*

6.3.2. Finding a control group to LDCs

Because LDC membership corresponds to a well-defined category as explained above, perform an impact analysis for the category is difficult. There seems to be no available

"control" group, i.e. countries with similar characteristics to LDCs, but not identified as LDCs, to which we can compare LDCs.

However, evolution and asymmetry between inclusion and graduation criteria have a consequence. There are LDCs that would not be eligible for inclusion if they were newly considered under the current rules and criteria; in the same way, there are non-LDCs countries that would not be eligible for graduation under the same rules and criteria if they were already on the LDCs list. These countries are called "*discordant" countries* in Guillaumont (2009) and constitute two groups of "similar" (in terms of their observable characteristics) countries meeting neither inclusion nor graduation criteria. The only difference is that one group is constituted of LDCs, which benefit from special support treatment, and the other group consists of countries which do not. Wisely used, this latter group could generate control observations, even though a problem of selection bias may remain[7].

Table 3 : Discordant countries (relative evolution)

1990-2008	Discordant LDCs	Discordant non-LDCs	difference
GDPpc	2.38	1.51	**
HAI	49.68	57.56	***
GNIpc	750	851	***
EVI	47.29	41.21	***

6.4. Empirical Strategy

Our strategy to construct the control group is twofold. First, we use the group of "discordant" countries to find a counterfactual and apply a matching estimator to identify the macroeconomic effect of LDC status. Then we use Altonji's ratio to assess the level of

[7]"Discordant" countries are countries meeting neither inclusion, nor graduation criteria, and as such are in similar situations, but some being LDCs and benefiting from the status, and others not being LDCs and not benefiting. There is potentially a problem of selection bias using a simple comparison of growth performance between discordant LDCs and discordant non-LDCs. Table 3 shows that discordant non-LDCs have better structural characteristics, but perform weaker than discordant LDCs in term of economic growth.

confidence of these estimates. Second, we use matching as a form of data pre-processing to reduce model dependence to variables distribution before applying parametric causal inference (FE, RE, IV (Heckman two-step method)). This new dataset is our second counterfactual.

Another important point in the empirical analysis concerned the application of identification criteria. Because the history of LDCs shows that the identification criteria were sometimes violated, for example Maldives, Samoa and Cape Verde resisted against being withdrawn from the list, while Papua New Guinea and Zimbabwe have refused to be included. To take that into account we have three choices:

(i)Before the Study: Talk to those who can might override assignment (administrators). Identify their concerns. If those concerns can be clearly articulated and uniformly implemented, then they can be made into exclusion criteria for getting into the study

(ii)Designing the Study: Combine RDD with a randomized or nonrandomized experiment, using two cutoffs with random (or nonrandom) assignment occurring in the interval that will be fuzzy (method used in Arcand et al. 2012)

(iii) Intent-to-Treat: In a randomized experiment, it is standard to analyze the data according to how people were assigned, not according to which treatment they actually received. This preserves the internal validity of the design. We apply this method in the Heckman selection model.

6.4.1. Selection on observables

(1) Matching estimator

As explained above, the evolution of criteria and their application replicate a kind of ex-post randomized experiment, which generates the "discordant" group. We perform nearest neighbor matching on this sub-sample.

Matching methods consist in finding a group of non-LDC countries that present similar characteristics to countries identified as LDCs (while reducing as much as possible theselection biasin the estimateoftreatment effect). Matching estimators rely on the assumption of "selection on observables"; in other words, non-random selection into membership based on countries unobservable characteristics is assumed away. Of course, there is a possibility that some unobservable characteristics related to special relations between industrialized countriesand some LICs may have influenced identification criteria and then the impact of membership. The challenge in this context is to evaluate the risk and importance of the (potential) selection bias related to these unobservable characteristics. This method allows identification of an average macroeconomic effect of LDC membership, but the empirical validity of this result depends on the validity of the assumptions made about the treatment, i.e. inclusion and graduation, on the unobservable characteristics, and on the resulting selection bias.

The average treatment effect for the entire sample (ATE) and the average treatment effect for treated groups (ATT) are obtained by comparing some macroeconomic variables between discordant LDCs and discordant non-LDCs. We use the Abadie and Imbens (2007)[8] bias adjusted matching estimator.

Mathematically, we consider a random sample of n countries indexed by i=1,...,n. Utilising the potential outcomes framework, Y_i(LDC) denotes the potential outcome of country i under treatment LDC[9]. The causal effect of the treatment group (LDC=1) relative to the control group (LDC=0) is defined as the difference between the corresponding potential outcomes.

[8] For details of the corrected bias estimator - see appendix.
[9] LDC=1 when the country is a least developed country; LDC=0 otherwise.

Formally,

$$\tau_i = Y_i(1) - Y_i(0) \qquad (1)$$

In the evaluation literature, several population parameters are of potential interest. The most commonly used include the ATE, the ATT, and the ATU (on untreated). These are defined as:

$$\tau_{ATE} = E[\tau_i] = E[Y_i(1) - Y_i(0)] \quad (2)$$
$$\tau_{ATT} = E[\tau_i \mid LDC = 1] = E[Y_i(1) - Y_i(0) \mid LDC = 1] \quad (3)$$
$$\tau_{ATU} = E[\tau_i \mid LDC = 0] = E[Y_i(1) - Y_i(0) \mid LDC = 0] \quad (4)$$

In general, the parameters τ_{ATE}, τ_{ATT}, and τ_{ATU} may vary with a vector of covariates, M. As a result, each parameter may be defined as conditional on a particular value of M as follows:

$$\tau_{ATE}[M] = E[\tau_i \mid M] = E[Y_i(1) - Y_i(0) \mid M]$$
$$\tau_{ATT}[M] = E[\tau_i \mid M, LDC = 1] = E[Y_i(1) - Y_i(0) \mid M, LDC = 1]$$
$$\tau_{ATU}[M] = E[\tau_i \mid M, LDC = 0] = E[Y_i(1) - Y_i(0) \mid M, LDC = 0]$$

The simple matching estimator may be biased in finite samples when the matching is not exact[10]. We use a finite number of matching variables[11]. Also, Abadie and Imbens (2002) show that, with *m* matching variables, the estimator may create a bias corresponding to the matching discrepancies[12]. In order to correct this bias, we use the Abadie and Imbens (2007) bias adjusted matching estimator.

[10] The matching cannot be exact since we cannot find two countries that are similar in everything except LDC membership.

[11] We use the GDP per capita, literacy and manufacturing for 1975-1990 and the EVI, HAI and GNI per capita for 1991-2008.

[12] Discrepancies correspond to the differences in covariates between matched units and their matches.

- *Does the unconfoundedness assumption fail?*

Estimating τ is not trivial; some assumptions are required in order to proceed. One such assumption is unconfoundedness of selection on observables. Under this assumption, treatment assignment is said to be independent of potential outcomes and conditional on the set of covariates, X. As a result, selection into treatment is random conditional on X, and the average effect of the treatment can be obtained by comparing outcomes of individuals in different treatment states with identical values of the covariates. This would imply that countries could not influence their inclusion in the LDC group and predict future gain of their membership.

(2) Using selection on observed variables to assess bias from unobservables

Although the sets of observables provide a substantial amount of country level information, they may not fully control for all relevant characteristics which explain the identification of LDCs, thus the possibility of some omitted variable bias remains. So, we measure the relative importance of selection on the unobservables bias by investigating how the coefficient of ATE changes with the inclusion of the additional explanatory variables. If including controls substantially attenuates the estimated coefficient, then it is possible that inclusion of more controls would reduce the estimated effect even further. If, on the other hand, the inclusion of controls has no effect on the estimated magnitude of the coefficient, then we can be more confident in suggesting a causal interpretation for the estimated relationship. Following Altonji et al., (2005), we formalise this intuition and derive the ratio of the "influence" of unobservable variables relative to the observable that would be needed to explain (away) the entire macroeconomic impact.

These additional explanatory variables are of two types:- first, short-term growth determinants (inflation, exchange rate, exports, size of government, and so forth), commercial relationships, natural resource rents, and -second, countries' individual control variables related to specific relationships with OECD countries, such as a colonial past or language[13]. A large ratio would imply that the ATE result could not be plausibly explained by the unobservables; full details of this method are provided in the appendix.

6.4.2. Matching as non-parametric pre-processing: causal inference with fewer assumptions

As mentioned earlier, the immediate aim of matching is to improve balance, or the extent to which the treatment and control covariate distributions resemble each other. For Ho et al. (2007) unless matching is exact, it is not a method of estimation and must be paired with another analytical method to obtain causal estimates.

Following Ho et al. (2007), we use matching to pre-process data before parametric estimations. In the pre-processed data set, the treatment variable is closer to being independent of the background covariates, which renders any subsequent parametric specification difference less important for the ATE. Indeed, by breaking or reducing the link between the treatment variable and control variables, pre-processing makes estimates based on parametric analyses far less dependent on modeling choices and specifications. Thus, the causal effect estimates do not vary much with the modeling assumptions.

An advantage of this two-step procedure is that it is doubly robust, in the sense that under weak conditions if either the matching or the parametric model is correct, but not necessarily

[13]For some critics, there are unobserved characteristics not related to official identification criteria which potentially influence LDC membership.

both, causal estimates will still be consistent. That is, if the parametric model is miss-specified, but the matching is correct, or if the matching is inadequate but the parametric model is correctly specified, then estimates will still be consistent. The common procedure of matching followed by an unadjusted difference in means does not possess this double robustness property[14].

To adjust the data without inducing bias in causal estimates we can select, duplicate, or selectively drop observations from an existing sample without bias, as long as we do so using a rule that is a function only of treatment T_i and covariate M_i. Our pre-processed data set will therefore include a selected subset of the observed sample for which T_i and M_i are unrelated, meaning that the treatment and control groups have the same background characteristics, or in other words, that this relationship holds

$$\tilde{p}\langle M \,|\, T=1\rangle = \tilde{p}\langle M \,|\, T=0\rangle$$

Our pre-processed dataset thus is the same as the original dataset with any unmatched control units discarded, and thus with T_i and M_i now independent. The effect of the matching procedure is to delete the observations that would have required substantial extrapolation, and which would have produced imbalance. With these deletions, the dataset is now highly balanced, and as such, different parametric models give essentially identical causal effects.

The result of this process, when done appropriately, is considerably less model dependent, with a reduced potential for bias, less variance, and as a result has a lower mean squared error. To ensure that selection during pre-processing depends only on M_i (to avoid inducing bias), the outcome variable Y_i should not be examined during the pre-processing stage. As long as Y_i is not consulted, and is not part of the rule by which observations are dropped, pre-processing cannot result in stacking the deck one way or another.

[14]All details of this matching procedure are attributed to Ho et al (2007) unless otherwise noted.

Matching can be viewed as a way to make the LDC and non-LDC covariates distributions look similar by re-weighting the sample observations. Thus, matching mimics a random assignment through the *ex post* construction of a control group. We use Genetic matching[15] to improve the degree to which the treatment and control covariate distributions resemble each other without losing too many observations or making additional assumptions in the process. Then we apply various parametric models (fixed effect, random effect, Heckman selection model[16] on endogenous treatment) to the pre-processed data and compare the average treatment effect estimates.

6.5. Data and Empirical Evidence

6.5.1. Data description

The starting point of this analysis is the "discordant" countries group of Guillaumont (2009) over the period 1991 to 2008. We also use a sample of 120 developing countries over the period 1975 to 2008 to perform the matching pre-processing algorithm. Our dependent variables are the GDP per capita average growth rate, the volatility of GDP and the volatility of exports after the triennial review of the LDC list. The set of covariates we use for matching are the observable characteristics used as identification criteria.

[15] Both propensity score matching and matching based on Mahalanobis distance are limiting cases of this method. The algorithm makes clear certain issues that all matching methods must confront.

[16] Wooldridge (2000) recommends this two-step method to estimate ATE with a heterogeneous treatment effect. We estimate in the first stage a probit of identification as LDC on eligibility and the other covariates of the growth model. Then we use fitted probabilities as instruments of LDC dummy and the other covariates in the second stage. The eligibility is random because it is based only on retrospective EVI, HAI and GNIPC.

Table 4 gives the summary statistics of some covariates and compares LDCs to Developing countries (DC). We observe that LDCs are more vulnerable to external shocks and poorer than DC. But since the mid-90s they have average growth rates higher than in other *developing countries*[17].

Information about countries' status is collected from FERDI and UNDESA databases[18]. The World Development Indicators (World Bank) provide the GDP per capita, exports to GDP ratio and short-term growth determinant variables used as control. Finally, data on the Economic Vulnerability Index (EVI) and the Human Assets Index (HAI) are provided by FERDI. EVI reflects the risk of being harmed by exogenous events or shocks; it is determined by the size of shocks, exposure and resilience to the shocks. HAI, which is also used for identifying LDCs, is an indicator of handicaps, revealing the lack of development capacity or capability. The other variables include level of economic development, aid fragmentation index, terms of trade, financial openness, government size, and institutional variables.

6.5.2. Selection on observables results (Non-Parametric strategy)

Using the Abadie and Imbens (2007) matching estimator (hereafter A-I) for the k- nearest neighbors, we calculate the ATEs[19]and ATTs for a sample of 43 countries for six triennial periods from 1990 to 2008. Table 6 provides the results.

[17]*P. Guillaumont (2013): Out of the Trap , forthcoming*

[18]FERDI (Fondation pour les études et recherches sur le développement international) and UN department of economics and social affairs (UNDESA).

[19]Coefficients give the impact of LDCs membership on growth rate' average; EVI, HAI, and income are used as matching variables.

Table 6: LDC membership treatment effects: Growth, volatility and response to shocks

	(1)	(2)	(3)	(4)	(5)
Period	**growth**	**Export volatility**	**Gdp volatility**	**Skewness gdp**	**Skewness export**
1990-2008	***0.60***** ***(0.01)***	***-0.07**** ***(0.06)***	***-0.063**** ***(0.08)***	***-0.21**** ***(0.09)***	***-0.28****** ***(0.049)***
S.E	***0.24***	***0.037***	***0.03***	***0.13***	***0.14***

p-valuesare in parentheses * Significant at 10%; ** significant at 5%; *** significant at 1%
Data: 41 discordant countries over six triennial periods from 1990-2008 (234 observations)
Matching variables: evi, hai, gnipc; treatment variable= dummy LDC
Dependent variables are log-transformed using the inverse hyperbolic sine transformation
Estimates of average treatment effect are obtained using the Abadie&Imbens –(k)-nearest neighbor bias corrected estimator with the Mahalanobis metric;
The same regressions are performed using Leuven and B. Sianesi. (2003) estimator for stata with the program "psmatch2", and r.ATE is k-nearest neighbor estimator with bootstrap standard errors

Interpretation:

Using the Abadie and Imbens (2007) matching estimator (hereafter A-I) for the k- nearest neighbors[20], we calculate the effect of LDC status on macroeconomic volatility. We use the subsample of "discordant" countries[21] over the period 1990 to 2008.

Table 6 reports the treatment effects estimated using the bias-adjusted nearest neighbor matching estimator. They provide estimates of the effect of LDC status over the period following LDCs list reviews.

Our first result suggests a positive and statistically significant correlation betweenthe LDC status and economic growth during the short-term period following review. This is an average effect of 0.6 per cent in growth over a triennial period. Table 6 also reports the treatment

[20] For each LDC, a number k of comparable non LDCs (regarding the three criteria) are selected with the Abadie and Imbens (2007) matching method.

[21] Coefficients give the impact of LDC membership on growth rate average.

effect on the volatility of exports and the volatility of output. It seems that countries benefiting of LDC status record a decrease in aggregate instability.

No less important, the LDC status has a positive effect on the country's response to shocks. Indeed columns 4 and 5 show negative effect of the status on the amplitude of the macroeconomic instability faced by the LDCs.

Robustness checks:

Heterogeneity of treatment effect: Crump et al. (2008)

We have performed the treatment effect heterogeneity test of Crump et al. (2008), the results are presented in the appendix (Table 8). Crump et al (2008) develop two non-parametric tests. The first for the null hypothesis that the treatment has a zero average effect for all sub-populations defined by covariates. The second test is for the null hypothesis that the average effect conditional on the covariates is identical for all sub-populations.

Our results reject the zero average treatment effect of LDC membership, and support the fact that the ATE of LDC status is heterogeneous. One can make a parallel between this result and those obtained by Arcand et al (2012), because it means that there are some countries, in some periods, for which the LDC status had no significant impact on growth. Perhaps those countries have been selected by the regression discontinuity design procedure.

Sensitivity analysis : (Ichino et al. 2007; Altonji et al. 2005)

As noted in section 3, the key identifying assumption of the matching estimator is the "selection on observables" condition. This condition may fail if there are omitted variables or unobservable country characteristics that affect both the membership of LDC category and the economic growth.

To address our concern about unobserved characteristics and selection bias the Altonji procedure, briefly presented in section 3.1 (b) and detailed in the appendix, provided more

information about the validity of matching results. This procedureallows the assessment of what levelofselectionmade on theunobservables is necessaryto invalidatetheresult,based only onselectionmadeonthe observables.

The Altonji ratios are reported in table 7; they range from 8.83 to 64. These values mean that to explain the estimated effects of the special support measures on LDCs' economic growth and macroeconomic vulnerability, the selection on unobservables should be on average 27 times greater than the selection on observables. This finding is highly improblable when we look at the history of LDC membership.

As an alternative, to determine how strongly an unmeasured variable must influence the selection process in order to undermine the implications of the matching analysis, we implemented the Ichino, Mealli and Nannicini (2007) sensitivity analysis (Table 8). The simulation-based sensitivity analysis of Ichino et al (2007) tests the estimated treatment effect, and confirms the result of matching estimates (see Table 8).

Both procedures confirm our previous finding about the positive correlation between economic growth and LDC membership, and the reduction of the macroeconomic vulnerability.

Even if, we know that selection on unobservables could be ignored without affecting our entire estimate effect, the fact is that we could not affirm that we have controlled for everything that could affect the treatment and outcome. For our purpose, we have to confirm these results using a framework with fewer assumptions and risk of selection bias. Thus, we apply our second strategy using matching as pre-processing.

6.5.3. Results on pre-processed data: FE, RE, IV (Parametric strategy)

Using the R package "MatchIt"[22], a matched dataset was created where each treated observation is matched with two or three control observations. We finally arrived at a dataset of 82 countries with 49 LDCs over the period 1975 to 2008. To generate our matched data we chose the *Genetic matching* algorithm of Diamond and Sekhon (2006), because it produces matches with the best balance.

To assess the balance we used two graphic tools. First we used the empirical quantile-quantile (QQ) plots to compare full empirical distributions for LDCs and the control group for each covariate (before and after pre-processing). Then we compared the propensity scores of the treated and control groups before and after pre-processing. Figure 2 shows a set of QQ plots for the dataset with triple-control matches. Two plots are given for each covariate, one prior to matching and one after. For these plots, the 45-degree line indicates identical distributions, and the closer the points on the plot are to that line, the better the matching. Figure 2 illustrates that the process of Genetic matching reduces significantly the differences in covariate distributions for LDCs and the control group.

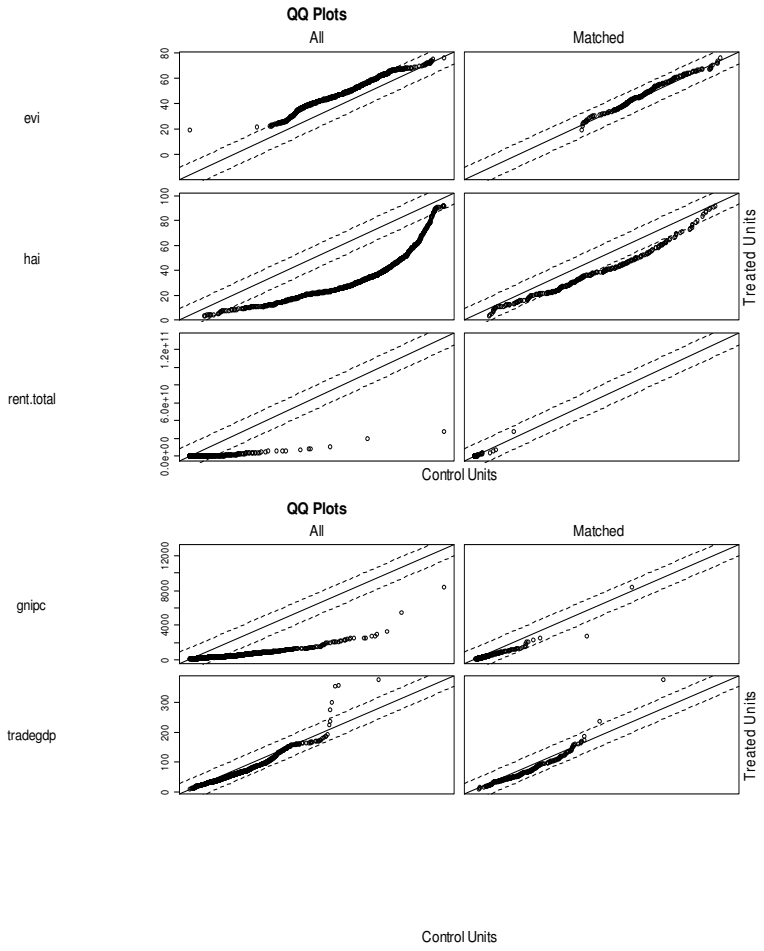
The covariates are:

- Inclusion criteria (Observables) : EVI, HAI, Population andGNI per capita;
- Unobservables to the inclusion: trade openness, availability of natural resource rents (oil and mineral) in the country, a dummy for former colonies, a dummy for common official language shared with the OECD countries. These variables are used to check

[22] MatchIt implements a wide range of sophisticated matching methods, making it possible to greatly reduce the dependence of causal inferences on hard-to-justify, but commonly made statistical modeling assumptions.

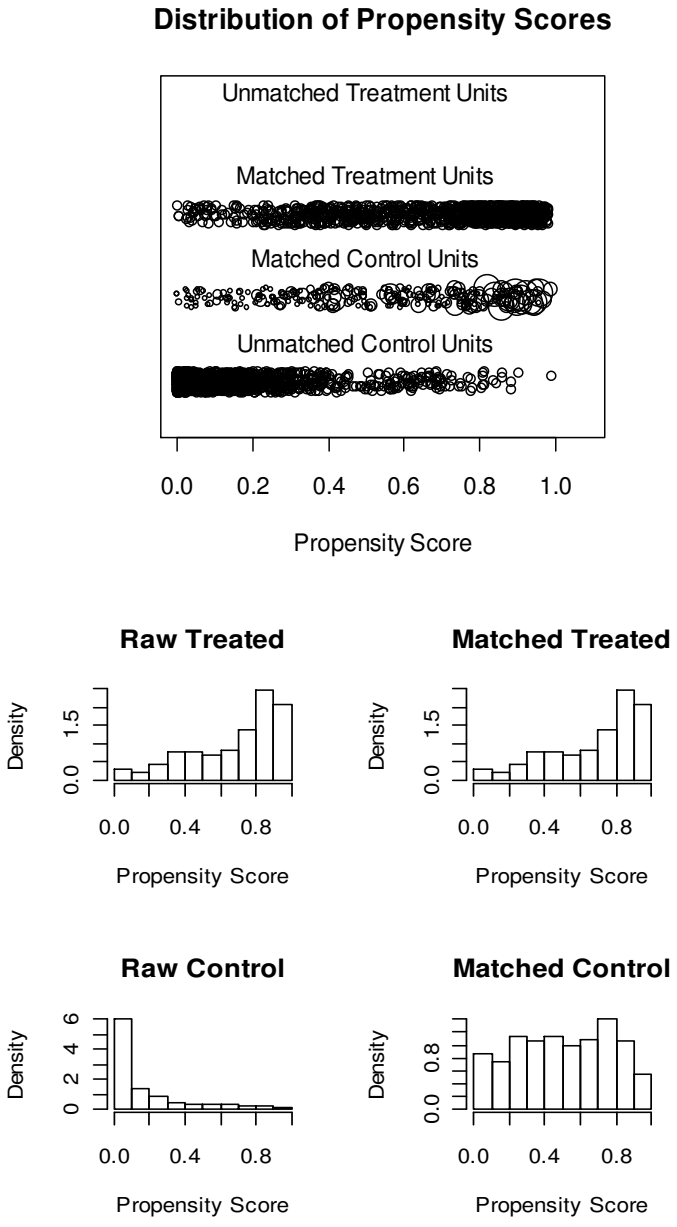
for the existence of a special relationship between countries, which may have influenced the identification.

Figure 2: Improvement of data after genetic matching



This improvement in the balance of covariate distributions is confirmed in Figure 3, with the comparison of the probability of being identified as an LDC country for both groups. We see clearly how the pre-processing procedure significantly reduces the difference in the probability of treatment between the treated group (countries finally classified as LDCs) and control group (countries with similar background- ex post- before the treatment but not selected).

Figure3: Pre-processing and propensity scores



Like the first strategy, the aim is to estimate the impact of the identification as LDC on the growth rate and macroeconomic vulnerability in the next triennial period. Then we perform some parametric estimation on the matched data to estimate the causal effect of LDC membership.

Our overall results confirm that LDCs seem to experience less economic vulnerability thanks to the support measures they have benefited prior to their status.

Tables 9: Parametric model results on matched data

Table 9.0: Hausmann test

Method	RE	FE
Growth rate	**GDPpc**	**GDPpc**
LDCs	**0.55****	0.39
	(0.01)	(**0.23**)
Rent	1.91**	3.18***
	(0.01)	(0.00)
Openness	0.30*	0.66**
	(0.09)	(0.04)
EVI	-0.06	0.69
	(0.88)	(0.27)
HAI	0.82***	0.78**
	(0.00)	(0.03)
Income	-0.094	-0.14
	(0.58)	(0.62)
Hausmann test	0.10	
const	-3.5**	-2.33
	(0.04)	(0.23)
Countries	82	82

* p<0.05, ** p<0.01, *** p<0.001; p-value in parenthesis

We also perform Least Absolute Deviation (LAD) regression on Table 10 (in appendix) to test the sensitivity of the results to outliers in the sample.

Table 9.1: LDCs and macroeconomic volatility (3-year =1980-2011)

Method	RE	Heckman	Heckman	Heckman[a]
	Growth of gdppc	**Growth of gdppc**	**Volatility exports**	**Volatility GDP**
LDCs	**0.48*** **(0.05)**	0.03 **(0.34)**	**-0.04** **(0.46)**	**-0.07***** **(0.00)**
Rent	1.39* (0.08)		**0.24** **(0.60)**	-0.75*** (0.00)
Trade openness	0.20 (0.34)	-0.18 (0.56)	0.007 (0.88)	0.06*** (0.06)
ComHistory				-0.02 (0.40)
Government size		0.47 (0.20)		-0.05** (0.02)
Financial openness			0.04 (0.15)	0.014 (0.22)
Inflation			0.039** (0.03)	0.016** (0.01)
Public invest		0.06* (0.05)		
Volatility of exports				0.004*** (0.00)
EVI	0.12 (0.34)			
HAI	0.63** (0.01)			
Income	-0.018 (0.91)			
Mills ratio[b]		-0.67 (0.29)	0.18 (0.16)	- 0.15 (0.12)
const	-3.6* (0.05)	-0.98 (0.47)	6.11*** (0.00)	4.19 (0.00)
Countries(obs)	82 (452)	82 (250)	82(250)	82(250)

* p<0.05, ** p<0.01, *** p<0.001; p-value in parenthesis.a: We estimate in the first stage a probit of identification as LDC on eligibility and the other covariates of the growth model. Then we use fitted probabilities as instruments of the LDC dummy and the other covariates in the second stage. The eligibility is random because based only on retrospectives EVI, HAI and GNIPC.
b: After the pre-processing matching, the non-significance of the Mills ratio here implies that the potential remaining selection due to difference between eligibility and treatment are not important.

Table 9.2: LDCs and macroeconomic volatility (annual 1990-2008)

Method	Heckman	Heckman	Heckman[a]
	Growth of gdppc	**Volatility exports**	**Volatility GDP**
LDCs	0.64*** (0.00)	**-0.09*** **(0.08)**	**-0.043***** **(0.00)**
Rent	1.27* (0.07)	0.02 (0.87)	-0.10*** (0.00)
Trade openness	0.35* (0.08)	-0.024 (0.54)	0.08*** (0.00)
ComHistory	-0.21 (0.57)		0.02 (0.20)
Government size			-0.06** (0.02)
Financial openness	-0.14 (0.17)	**0.057**** **(0.00)**	0.028*** (0.00)
Inflation	-0.08* (0.08)	0.01 (0.22)	0.006** (0.01)
Public invest			
Volatility of exports			1.08*** (0.00)
Mills ratio[b]	0.32 (0.23)	0.003 (0.94)	- 0.07 (0.01)
const	-4.03 (0.00)	6.47*** (0.00)	-0.81 (0.00)
Countries(obs)	62 (1030)	62(1030)	62(1030)

a: We estimate in the first stage a probit of identification as LDC on eligibility and the other covariates of the growth model. Then we use fitted probabilities as instruments of the LDC dummy and the other covariates in the second stage. The eligibility is random because based only on retrospectives EVI, HAI and GNIPC.
b: After the pre-processing matching, the non-significance of the Mills ratio here implies that the potential remaining selection due to difference between eligibility and treatment are not important.

Table 9.3: LDCs and Response to shocks (3 year-period)

Method	RE	Heckman	RE	Heckman[a]
	Skewness gdp	**Skewness of gdp**	**Skewness exports**	**Skewness exports**
LDCs	**-9.27**** **(0.03)**	-14.4** **(0.01)**	**-3.96*** **(0.08)**	**-5.31*** **(0.06)**
Rent	-32.1 (0.19)	-76.2* (0.05)	-22.8* (0.08)	-55.4*** (0.00)
Trade openness	9.27** (0.01)	8.10* (0.05)	2.20 (0.19)	2.76 (0.19)
Financial openness	3.87* (0.05)	3.95* (0.09)	1.72* (0.09)	2.26* (0.07)
Inflation	2.87** (0.03)	4.05*** (0.00)	0.78 (0.26)	1.69** (0.03)
EVI	-9.91 (0.23)			
HAI	2.39 (0.51)			
Income	-4.54 (0.26)			
Mills ratio[b]		-1.18 (0.88)		7.25* (0.08)
const	5.63 (0.88)	-53.12* (0.05)	-16.6* (0.07)	-7.31*** (0.00)
Countries	82	82	82	82

Interpret estimation after inverse hyperbolic sine transformation

*Dependent variable transformed

In such models where the dependent variable has been log-transformed and the predictors have not, the format for interpretation is that dependent variable changes by 100*(coefficient) percent for a one unit increase in the independent variable while all other variable in the model are held constant.

*Independent variable transformed

In this model we are going to have the dependent variable in its original metric and the independent variable log-transformed. A one percent increase in the independent variable increases (or decreases) the dependent variable by (coefficient/100) units.

*Both dependent and independent variables transformed

In instances where both the dependent variable and independent variable(s) are log-transformed variables, the relationship is commonly referred to as elastic in econometrics. In a regression setting, we'd interpret the elasticity as the percent change in y (the dependent variable), while x (the independent variable) increases by one percent.

6.6. Conclusion

To add to the debate about the usefulness of the status "Least Developed Country", which has been recognised by the UN since 1971, this paper investigates whether special support measures designed for the Least Developed Countries (LDCs) affect the macroeconomic vulnerability of such countries. Such an evaluation is useful to reaffirm the importance of these support measures for LDCs, because there is an erosion in effective market access for LDCs paired with the risk of collapse in ODA received given the debt crisis faced by major donors. This paper tries to provide empirical estimates of the implications of LDC membership for growth and macroeconomic vulnerability.

Such an assessment always faces problems of selection bias in the construction of the control group, omitted variables in model construction and sensitivity of the findings to unobservables potentially influencing selection process and the impact of programs or policies engaged. In our empirical strategy, we associated two methods to build the control group for the assessment of the impact of LDC status. Matching estimators provide estimates of average effect of LDC membership on economic growth, exports instability and output volatility of members, minimizing selection bias in identification process of LDCs, as suggested by Altonji's ratio on the influence of unobservables. Because our matching estimates do not explicitly address selection on unobservables, we use parametric methods after matching pre-processing to eliminate the link between LDC treatment and (observed and unobserved) control variables.

We find that membership in LDC category has a significant growth enhancing effect for countries. The average effect is gain of 0.5 per cent on economic growth in the short-term period following inclusion. Nevertheless, as point out in this analysis, this growth effect is heterogeneous across countries and time. Furthermore, our preliminary results demonstrate

that the least developed countries respond better to external shocks and are less vulnerable prior to the support measures linked to the LDC status, even if a long road remain before to get these countries out of the poverty trap.

Tables and figures

Table 1: Structural handicaps to growth

1971-2009	LDCs	Others LICs	difference
Human capital			
Under Five Mortality Rate	161	68	***
Undernourished prevalence	31	14	**
Literacy rate	49	77	**
Secondary Enrollment Gross rate	20	59	**
Vulnerability			
Exposure to shock	51,8	36,9	***
Affected by natural disasters	1803,8	530,8	**
Displaced because conflicts	110,16	25,24	

Source: Caught in a Trap: Identifying the Least Developed Countries (Guillaumont, 2009)

Table 4 : Summary statistics 1975-2008

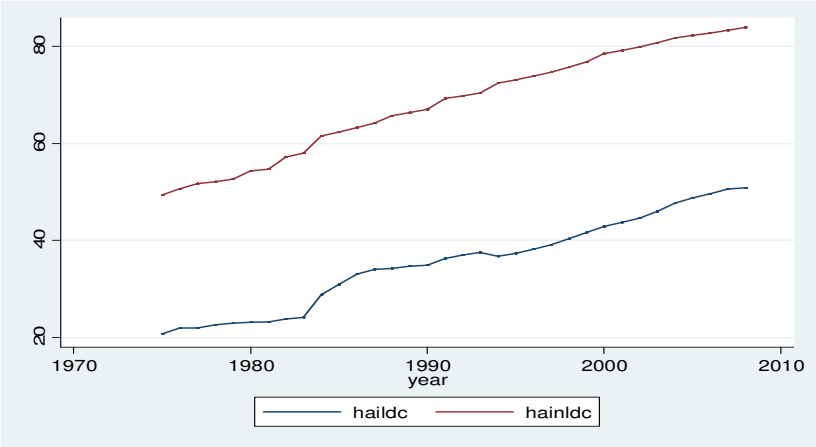
1975-2008	LDCs	Other DCs	difference
Growth rate (gdppc)	1.63	1.68	
HAI	38.39	69.17	***
GNIpc	507	2220	***
EVI	47.49	38.46	***
Resource Rent	0.035	0.087	***
Openness	66.64	77.48	***
Countries	50	69	
Eligible countries	40	13	

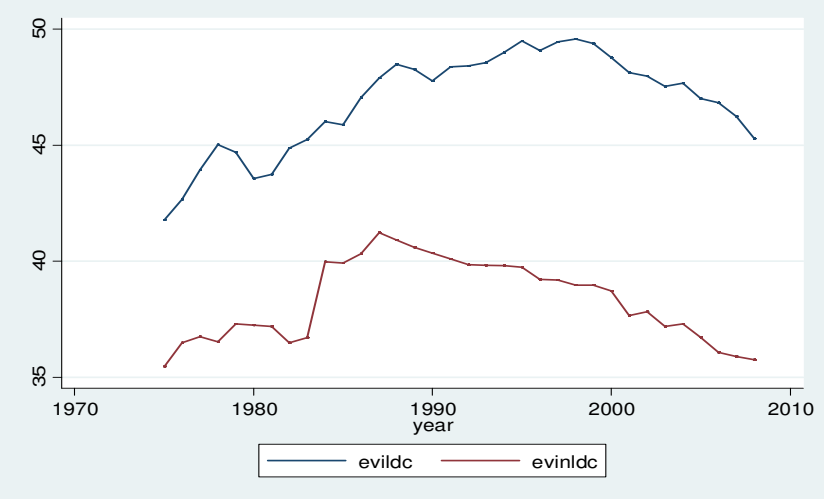
Variable	Obs	Mean	Std. Dev.	Min	Max
Growth rate	3343	3.83	6.27	-51.03	106.28
HAI	3546	58.12	24.43	3.46	99.82
GNIpc	3546	1604.75	2006.10	72.45	17883.57
EVI	3546	41.71	12.34	12.96	75.5
Resource Rent	2997	0.069	0.155	0	2.13
Openness	3308	73.82	40.21	0.31	280.36
Former colonies	3546	0.914	0.281	0	1

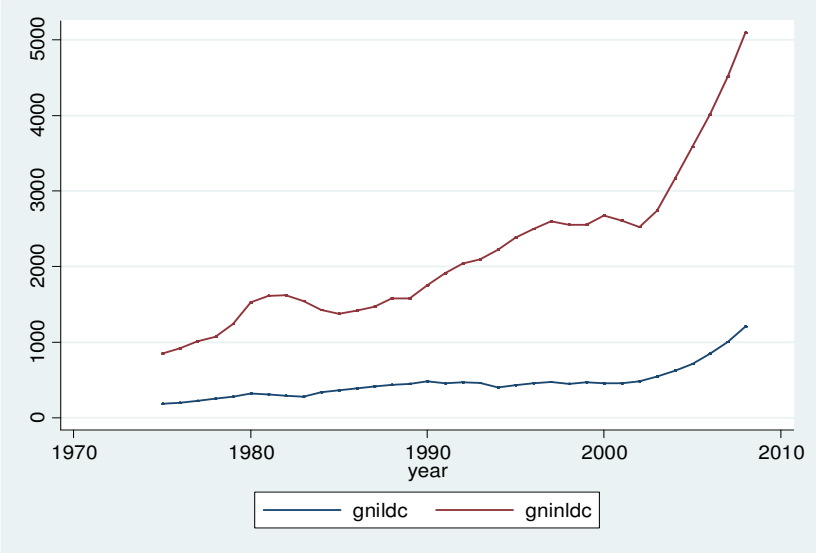
Table 5: Partial correlation of core variables

Variable	Gdppc	HAI	GNIpc	EVI	Resources	Openness
Gdppc	1.0000					
HAI	0.1338	1.0000				
GNIpc	0.1240	0.6033	1.0000			
EVI	0.0890	0.3940	0.2294	1.0000		
Resources	0.0975	0.0269	0.2485	-0.0324	1.0000	
Openness	0.2166	0.5091	0.4414	0.3586	0.1026	1.0000

Figure 1 : Comparative evolution (LDCs vs DCs)







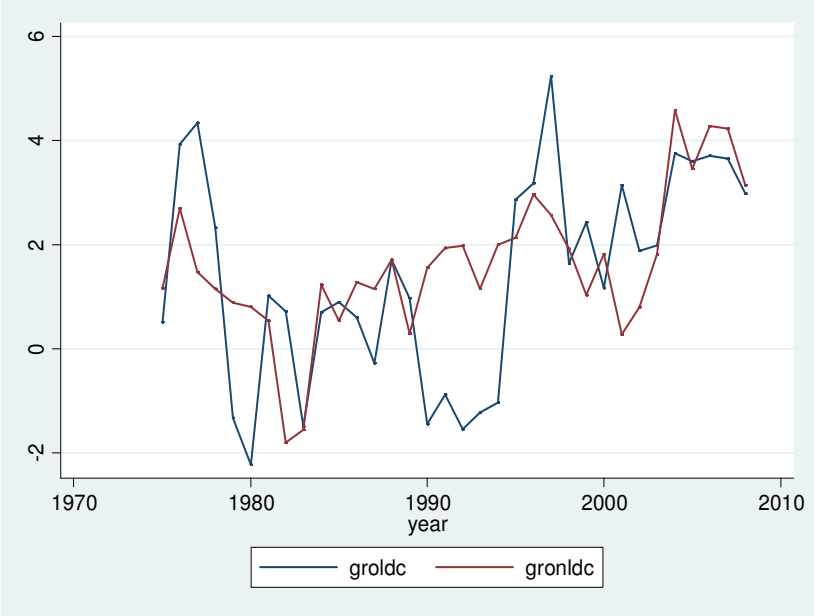
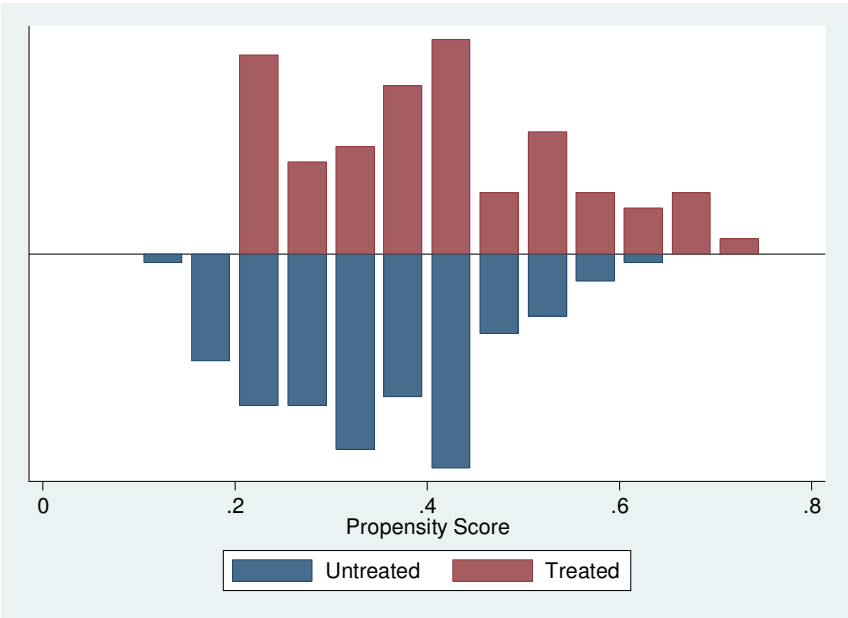


Table 2 : Statistics on discordant countries

1990-2008	Discordant LDCs	Discordant non-LDCs	difference
Gdppc	2.38	1.51	**
HAI	49.68	57.56	***
GNIpc	750	851	***
EVI	47.29	41.21	***

Table 2 (continued) :



Test on propensity score difference
Ho: pscore(dldc==0) = pscore(dldc==1)
z = -1.026
Prob> |z| = 0.3049

Table 7: Assess the bias from unobservables (Altonji's ratio)

Restricted model	Extended Model	Ratios
No control	Full set of controls	64
MRW (1992)	Full set of controls	44.2
No control	With additional controls	8.83
MRW (1992)	With additional controls	8.27
Full set of controls	With additional controls	10.41

Table 8: Robustness checks

Simulation-based sensitivity analysis results

Sensatt	first stage (radius matching)	second stage (bootstrap with simulated confounder)
ATT	0.524* (1.73)	0.677 * (1.89)
Sel. eff.		1.5
Bias	0.804	

Test of treatment effect heterogeneity (Grump et al. 2008)

	Zero_Cond_ATE	Const_Cond_ATE
Chi-Sq_Test	17.6583	17.6580
dof_Chi-sq	4.0000	3.0000
p-val_Chi-sq	0.0014	0.0005
Norm_Test	4.8289	5.9841
p-val_Norm	0.0000	0.0000

Table 10: LAD regressions

This table reports the results of a set of least absolute deviation (LAD) regressions in which the GDP growth rate is regressed over LDC dummy and a set of independent variables. Variables are log transformed using the inverse hyperbolic sine. Bold indicated statistically significant coefficients. The purpose being to test the sensitivity of our previous estimates of growth effect to potential outliers.

	GDP growth
LDC	**0.42*** (0.00)**
Gov size	**-0.65*** (0.00)**
EVI	**-0.47*** (0.00)**
HAI	**-0.58*** (0.56)**
Income	0.04 (0.72)
Trade Openness	**0.311** (0.02)**
Inflation	**-0.01** (0.02)**
Natural resources rent	0.98 (0.15)
observations	
countries	82

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Appendix:

List of countries and LDC status evolution

Year / country	Year of triennial review						
	1991	1994	1997	2000	2003	2006	2009
Afghanistan			X				X
Angola						X	X
Bangladesh	X		X	X	X	X	X
Bhutan							X
Botswana	X						
Cameroon			X	X	X	X	
Cape Verde	X	X	X	X	X	X	
Congo,Rep of				X	X	X	
Côte d'Ivoire			X	X	X	X	X
Dem. Peo'sRep.Korea				X	X	X	X
Djibouti		X			X	X	X
Equatorial Guinea				X		X	X
Eritrea				X			
Ethiopia						X	X
Ghana	X		X	X	X	X	X
Guinea							X
Guyana	X	X	X	X			
Haiti	X	X					
Kenya		X	X	X	X	X	X
Kiribati	X	X	X	X	X	X	X
Laos	X	X					X
Lesotho	X	X	X	X		X	X
Liberia			X	X			
Madagascar		X		X	X	X	X
Maldives	X	X	X	X	X	X	X
Mauritania						X	
Mongolia			X	X	X	X	X
Mozambique	X	X	X		X		
Myanmar	X	X	X	X	X	X	X
Nepal					X	X	X
Nicaragua			X	X	X	X	
Papua New Guinea					X	X	X
Samoa	X	X	X	X	X	X	X
Sao Tome and Principe			X		X	X	X
Senegal			X				X
Solomon Islands			X				X
Tanzania, United Rep. of					X	X	X
East Timor							X
Tuvalu	X	X	X	X	X	X	
Vanuatu	X	X	X	X	X	X	
Vietnam	X	X	X	X	X		
Yemen	X						
Zimbabwe				X	X	X	X
Total	17	16	23	24	24	24	28
LDC	14	12	14	12	12	17	21
Non-LDCs	3	4	9	12	12	7	7

1. color blue shows period of membership
2. X refer to discordant (LDCs and non-LDCs)

Abadie and Imbens (2002, 2007) estimator

For each observation i, the unit-level treatment effect is $\tau_i = Y_i(1) - Y_i(0)$; however, only one of the potential outcomes $Y_i(0)$ or $Y_i(1)$ is observed, and the other is unobserved or missing. The matching estimators we consider impute the missing potential outcome by using average outcomes for individuals with "similar" values for the covariates. Let the observed outcome be denoted by Y_i:

$$Y_i = Y_i(W_i) = \begin{cases} Y_i(0) & if\ W_i = 0 \\ Y_i(1) & if\ W_i = 1 \end{cases}$$

Considering the set of observed covariates for an individual i, Xi, let $\|x\|_V = (x'V\ x)^{1/2}$be the vector norm with positive definite matrix V . We define $\|z - x\|_V$ as the distance between the vectors x and z, where z represents the covariate values for a potential match for observation i. Let $d_M(i)$ be the distance from the covariates for unit i, Xi, to the*M*th nearest match with the opposite treatment. Allowing for the possibility of ties, at this distance fewer than M units are closer to unit i than $d_M(i)$ and at least M units are as close as $d_M(i)$. Formally, $d_M(i) > 0$ is the real number satisfying

$$\sum_{l:W_l=1-W_i} 1\left\{\|X_l - X_i\|_V \prec d_M(i)\right\} \prec M \qquad and \qquad \sum_{l:W_l=1-W_i} 1\left\{\|X_l - X_i\|_V \le d_M(i)\right\} \ge M$$

where $1\{\cdot\}$ is the indicator function, which is equal to one if the expression in brackets is true and zero otherwise.

Let$J_M(i)$ denote the set of indices for the matches for unit i that are at least as close as the*M*th match:

$$J_M(i) = \left\{l = 1,..., N \middle| W_l = 1 - W_i, \|X_l - X_i\|_V \le d_M(i)\right\}$$

If there are no ties, the number of elements in$J_M(i)$ is M but may be larger. Let the number of elements of$J_M(i)$ be denoted by $\#J_M(i)$. The first estimator that we consider, the simple matching estimator, uses the following approach to estimate the pair of potential outcomes:

$$\hat{Y}_i(0) = \begin{cases} Y_i & if\ W_i = 0 \\ \dfrac{1}{\neq J_M(i)} \displaystyle\sum_{l \in J_M(i)} Y_l & if\ W_i = 1 \end{cases}$$

and

$$\hat{Y}_i(1) = \begin{cases} Y_i & if\ W_i = 1 \\ \dfrac{1}{\neq J_M(i)} \displaystyle\sum_{l \in J_M(i)} Y_l & if\ W_i = 0 \end{cases}$$

Namely, given that only one potential outcome is observed for each observation i, the observed outcome Yi = Yi(0) or Yi(1) represents one potential outcome. The unobserved outcome is estimated by averaging the observed outcomes for the observations of the opposite treatment group that are chosen as matches for i.

Using these estimates of the potential outcomes, the simple matching estimator (ATE) is

$$\hat{\tau}_M^{ate} = \frac{1}{N}\sum_{i=1}^{N}\left\{\hat{Y}_i(1) - \hat{Y}_i(0)\right\} = \frac{1}{N}\sum_{i=1}^{N}(2W_i - 1)\{1 + K_M(i)\}Y_i, \quad K_M(i) = \sum_{l=1}^{N} 1\{i \in J_M(l)\}\frac{1}{\neq J_M(l)}$$

K'_M (i) represent a comparable measure in which the square of the number of matches is used as the weight.

The simple matching estimator will be biased in finite samples when the matching is not exact. Abadie and Imbens (2002) show that, with k continuous covariates, the estimator will have a term corresponding to the matching discrepancies (the difference in covariates between matched units and their matches) that will be of the order$Op(N^{-1/k})$. In practice, we may therefore attempt to remove some of this bias term that remains after matching.

Let $\mu_w(x) = E[Y(w)|X = x]$, and let $\hat{u}_w(X_i)$ be a consistent estimator of $\mu_w(x_i)$. A regression imputation estimator uses $\hat{u}_0(X_i)$ and$\hat{u}_1(X_i)$ to impute missing values of Yi(0) and Yi(1), respectively.

Finally, we consider a bias-corrected matching estimator where the difference within the matches is regression-adjusted for the difference in covariate values:

$$\tilde{Y}_i(0) = \begin{cases} Y_i & if\ W_i = 0 \\ \frac{1}{M} \sum_{j \in J_M(i)} \left(Y_j + \hat{\mu}_0(X_i) - \hat{\mu}_0(X_j) \right) & if\ W_i = 1 \end{cases}$$

and

$$\tilde{Y}_i(1) = \begin{cases} Y_i & if\ W_i = 1 \\ \frac{1}{M} \sum_{j \in J_M(i)} \left(Y_j + \hat{\mu}_1(X_i) - \hat{\mu}_1(X_j) \right) & if\ W_i = 0 \end{cases}$$

with corresponding estimator $\tilde{\tau}_M^{ate} = \frac{1}{N} \sum_{i=1}^{N} \left\{ \tilde{Y}_i(1) - \tilde{Y}_i(0) \right\}$.

Supposing the regression function $\mu_w(x)$ is given by the nonparametric series estimator of Newey (1995),let $\hat{B}_M^m$ be the estimated bias term:

$$\hat{B}_M^m = \frac{1}{N} \sum_{i=1}^{N} \left\{ W_i \left(\frac{1}{M} \sum_{j \in J_M(i)} \left(\hat{\mu}_0(X_i) - \hat{\mu}_0(X_j) \right) \right) - (1 - W_i) \left(\frac{1}{M} \sum_{j \in J_M(i)} \left(\hat{\mu}_1(X_i) - \hat{\mu}_1(X_j) \right) \right) \right\},$$

Abadie and Imbens (2007) propose a bias correction that renders matching estimators $N^{1/2}$ – consistent and asymptotically normal:

$$\hat{\tau}_{corrected}^{ate} = \hat{\tau}^{ate} - \hat{B}_M^m$$

Altonji et a. (2005): Assessing the Importance of selection on unobservables bias

Consider first a Mankiw, Romer and Weil (1992) growth model with LDC dummy (that we call "restricted model" denote by R), were X are growth determinants

$$Y = \alpha T + X'\gamma + \varepsilon ;$$

The OLS estimation of the effect of special measures on countries growth performance, have a standard omitted variables bias (Wooldridge, 2002):

$$P\lim \hat{\alpha}_{ols,R} = \alpha_0 + \quad \gamma \frac{\text{cov}(T, x'\gamma)}{\text{var}(T)} .$$

Now, suppose additional individual controls, unobservable for researcher during the identification process, but that could potentially influence outcomes and assignment of LDC status within the group of discordant countries such that: $X = x + \tilde{X}$ (x are observed). The new ols (???) estimate of α will have the following bias:

$$P\lim \hat{\alpha}_{ols,extend} = \alpha_0 + \quad \gamma \frac{\text{cov}(T, \tilde{X})}{\text{var}(T)}, \text{ "extend" denotes the new model.}$$

The intuition of authors of Altonji et al (2005), is that the ratio between the estimates in restricted and extended models,

$$\hat{\alpha}_{ols,extend} \Big/ (\hat{\alpha}_{ols,R} - \hat{\alpha}_{ols,extend}) = \frac{\text{cov}(T, \tilde{X})}{\text{cov}(T, X'\gamma)}$$

measures how much stronger the selection on unobservables needs to be, relative to observables, to explain the entire effect. The ratio shows how strong the covariance between the unobserved countries characteristics and identification of LDCs must be, relative to covariance between the observed characteristics and the assignment of status treatment, to explain the entire growth impact. A large ratio suggests that it is implausible that potential unobserved variables bias explains away the entire effect.

We consider two sets of restricted covariates: one with no controls and another with a set of growth determinants including initial income, physical capital, and human capital. We also consider two sets of extended covariates: one with additional short-term growth determinants (inflation, exchange rate, exportation, size of government…) and a second adding to the first, some individual control variables related to specific relationships with OECD countries, such as colonial past of countries, language[23] or commercial interest (availability of natural resource rent and openness are used as proxy).

[23]For some critics, some unobserved characteristics not related to official identification criteria potentially influence LDC membership.

Description of core variables

Variable	Code	Original data source	Notes
Per-capita GDP	gdppc	World bank Indicators (2010)	
Human Asset Index	HAI	FERDI www.ferdi.fr	Korachais C. (2011). Human Assets Index retrospective time series
Economic Vulnerability Index	EVI	FERDI www.ferdi.fr	Cariolle, J. (2011) "L'indice de vulnérabilité économique, élaboration et analyse des séries rétrospective de 1975 à 2008"
GNI per capita	Gnipc	UNSTAT (2010)	
Exports to GDP	Export	WDI (2010)	
Openness	Trade	WDI (2010)	
Natural resource rent	Rent	Luc Désiré Omgba (2007)	"Oil rents and the tenure of the leaders in Africa" *Economics Bulletin,* Vol. 3, No. 42
LDC dummy	LDC	CDP triennial report	
Ex-post Eligibility	Eligibility	Author	Use of retrospective data (EVI, HAI) and GNIpc to estimate the ex-post eligibility of countries for LDC identification based on 2006's criteria
Common language with OECD countries	comlang	Cepii data	Variable "Common history "
Former colonies	coloecd	Cepii data	
Population	Pop	WDI (2010)	

Additional variables

Variable	**Definition**	**Source**
Variation of reserves	Change in international reserves	WEO
Financial openness	Chinn-Ito Financial Openness Index	Chinn and Ito (2006)
AF index	Aid fragmentation index	Authors
Imports	Imports of goods and services (% of GDP)	WDI
Inflation	Inflation rate (CPI, percentage change)	WDI
Gov size	General government final consumption expenditure (% of GDP)	WDI
Public Investment	Public Investment	IMF-IFS
Short-term debt	Short-term debt (% GDP)	WDI
M2	Money and quasi money (% of GDP)	WDI
Agri value added	Agriculture, value added (% of GDP)	WDI

General Conclusion

The issue of financing development through foreign capital flows has attracted significant attention in policy and academic circles since the 1970s. This gave rise to a highly controversial literature about these flows, especially on foreign aid flows or more recently on private flows such as FDI and remittances. These flows should be able to finance and support the actions of the main economic agents in developing countries, respectively government, firms and households. Indeed, foreign aid is mainly oriented to support the government budget and finance public investments, while workers' remittances and FDI flow to the private sector. Remittances are dedicated to stabilize households' income and consumption, and FDI consist in the creation of new capital for local firms. Given the large volume of these flows, many empirical studies became interested to their macroeconomic implications for the recipient countries. In addition, if the stakes are at different levels for each flow, the existing literature was heavily influenced by the controversies regarding the preconditions and factors influencing their effectiveness to promote growth. Moreover, in recent decades, changes in global economic and political powers and the emergence of new actors in development cooperation have greatly changed the environment of development finance.

This thesis is concerned with both the evolution in development finance environment and the macroeconomic implications of development finance flows for DCs, and their effectiveness to promote growth. First, using meta-analysis this thesis investigated the causes of controversial findings in the existing literature about the capacity of these flows to promote growth. It appears that political and ideological appurtenance as well as authors' methodological and econometric choices, determine the quality of reported estimates…The second part of the thesis relies on the revolution going on in the aid architecture with the increasing influence of

emerging donors and the consequences for aid allocation and recipient countries. The third part discusses macroeconomic implications of development finance.

In the first part, Chapters 1 and 2 showed the importance of the authors' characteristics and institutional affiliations in the research process, highlighting the fact that the researcher can be influenced in his argument by the environment in which it belongs. These personal factors would also define methodological choices made in the empirical analyses.

Chapter 1 conducted a meta-analysis of the literature of aid effectiveness to test the hypothesis that aid is conditionally effective. The results allowed us to establish that if there is a publication bias due to authors and editors, empirical evidences still confirm that the policy environment determines the effectiveness of aid. In addition, econometric regressions have shown the methodological choices responsible of heterogeneous findings. First, the measure of aid flows, Official Development assistance (ODA) or Effective development assistance (EDA), influences the quality of the analysis. The studies using EDA provide more precise picture of disbursed foreign aid. Second, to capture the impact of aid on growth, studies should follow the growth model literature and use longer periods of analysis. Third, the econometric specifications used for the treatment of endogeneity, as well as the control for transmission channels, also matters for the reported results.

As far as that goes the chapter 2 explains why results vary across Remittance/Growth studies, and summarizes the true empirical effect of remittances on growth. The meta-analysis of results collected from existing empirical studies reveals that remittances have positive indirect effects on growth. Suggesting that the research should focus on channels and mechanisms by which remittances affect growth. In the other hand, it appears that like in aid literature, non-empirical factors related tothe research environment also represent an important issue for the quality of empirical evidences reported by authors.

The second part of the thesis begins with the analysis of the influence of emerging donors aid allocation on government fiscal choices in recipient countries. The starting point argument is that emerging donors are encouraging poor policies, lowering standards and increasing the debt burden of recipient countries because they do not apply conditionality, in terms governance and macroeconomic policies reforms, on their aid. The chapter 3, thus empirically documents this argument. Panel data evidences show that even if non-DAC aid allocation is generally associated with a change in government borrowing behavior, the increasing influence of emerging donors in development assistance does not lead to bad fiscal performance in countries welcoming their aid. The results indicate that welcoming emerging donors' aid increases the room for manoeuvre of recipient countries. First, evidences do no support that non-DAC aid undermines government fiscal effort. Moreover, the presence of emerging donors seems to increase the real transfer of resources to recipient governments, either directly via imports or indirectly via increases in public expenditure.

The analysis of the consequences of the increasing influence of emerging donors is extended toward the aid allocation of DAC members (traditional donors) in chapter 4.Given the importance of political and strategic interests behind development cooperation, this chapter analyzed the multilateral and bilateral reactions of DAC members in face of the emergence of new donors in development assistance. Several results emerged. Countries where emerging donors have a big influence, receive less multilateral aid from DAC members, as if DAC multilateral aid were substituted by ODA from emerging donors. However, the bilateral aid allocation model shows that DAC donors increase their ODA to maintain their "lead donorship" in recipient countries, and so preserve their commercial, political, and strategic self-interests. Furthermore, the results suggested that this competition among donors lead to a deterioration in the orientation of aid allocation decisions toward recipient's needs.

The last part of this thesis revisits the empirical evidence about the influence of development finance on developing countries business cycles. The Chapter 5 examines the incidence of foreign aid, workers' remittances and foreign direct investment flows on business cycles in developing countries. Our analysis helps to see whether development finance flows increase the exposition of developing countries to external shocks. This chapter contributes to the existing literature in several dimensions. First, this chapter presented a simple real business cycle (RBC) model for developing countries, accounting for the major macroeconomic shocks faced by those countries. The predictions of the theoretical framework show that foreign aid, FDI and remittances can account for twenty-six percent of output fluctuations in our representative developing country. Thus, development finance flows are responsible of an important fraction of the instability of output in recipient's country. The interest of this chapter relies also in the association of DSGE modeling to panel data analysis. The econometric results also reveal that domestic shocks are not the main factor driving business cycles fluctuations in DCs. Panel VAR estimations show that internal factors can only explain thirty-five percent of the output instability in developing countries. It also emerges from this chapter that while FDI flows are procyclical, foreign aid and remittances appear counter-cyclical to recipients' economic fluctuations. To sum up, this chapter provides empirical evidences that the presence of development finance flows offers both opportunities and challenges to recipient countries, as they increase their exposition to external shocks.

The last chapter of this thesis provides an impact evaluation of one of the most important programs designed for the most vulnerable countries. Chapter 6 investigates whether special support measures designed for the Least Developed Countries (LDCs) have improved their macroeconomic vulnerability. This chapter provides an interesting empirical strategy that could help to circumvent the problems faced by impact evaluation at the macro level,

particularly in terms of the construction of the counterfactual group and the analysis of unobservables influencing the treatment process. Our impact analysis revealed that membership in LDC category has a significant growth enhancing effect for countries. The LDC status is related an average to an economic growth rate gain of 0.5 per cent in the short-term period following inclusion. Furthermore, this chapter demonstrates that the least developed countries respond better to external shocks and are less vulnerable prior to the support measures linked to the LDC status.

Policy implications:

The evidence shows that quality of the policy environment determines the impact of foreign aid on economic growth. This finding supports the claim that the donors' bilateral aid allocation should be more biased towards merit and good of economic environment in recipient governments. Multilateral agencies are important given that their aid allocation is less constrained by donors' self-interests.

The second relevant policy message emerges from both our meta-analysis on remittances and our RBC model, and state that remittances do not have a direct positive effect on output. Given the fact that only indirect effects are significant, governments should think about policies that could enhance the transmission channels on long run growth rate, instead of promoting measures that could only increase remittances receipts. Some recent studies argue for example about the choice of the appropriate taxation system in the remittance-dependent countries.

International development cooperation is in a period of major transition. The system is becoming more fragmented with diverse actors, funding sources and delivery modes.

Emerging donors, by quietly offering positive alternatives to aid-receiving countries, they are introducing competitive pressures into the existing system. They are weakening the bargaining position of western donors in respect of aid-receiving countries. Despite the political sensitivities about ODA, the DAC and other providers might have a more fruitful conversation about the set of official finance flows for development because their competition is badly affecting the quality of aid. Reflecting these concerns, in 2007 the United Nations' Economic and Social Council (ECOSOC) launched the Development Cooperation Forum (DCF) to promote a more effective international development cooperation. The DCF aims to bring together a wide range of stakeholders, including DAC and non-DAC donors, aid-recipient countries, multilateral institutions, parliamentarians, local governments, and a range of civil society and private sector actors. The interest of DCF is to incorporating the views of Southern partners in the development cooperation and thus provides an environment that allows traditional donors and developing countries to discuss aid allocation issues.

The findings of this thesis militate in favor of such initiative like DCF that will provide sufficient incentives for non-DAC donors to engage with other donors and the aid architecture. In the other hand, developing countries should be aware of this revolution in aid architecture as well as the consequences for them. Thus, they should not just adopt a passive willingness to accept whatever aid is offered but should be able to design strategic absorption and spending policies that could help them to take full advantage of their new sources of funding. Emerging donors' aid allocation is estimated between $11 billion to $41.7 billion per year, representing 8 percent and 31 percent of global gross ODA. This thesis has shown that the role of emerging donors is not limited to their contribution to the rise of aid received but also increases the fiscal room of manoeuvre of recipient governments. Moreover, the presence of emerging donors is an insurance against sudden stop in foreign aid that send a positive

signal to private sector that fears the potential fiscal pressures following the end of aid surge. Thus fiscal authorities in developing countries could manage private sector expectations and improve their policies response to aid by avoiding capital flight and higher inflation rates through a diversification of aid donors.

Macroeconomic management in developing countries is a recurrent concern in this thesis. Better understanding of macroeconomic vulnerabilities in developing countries should help policy makers to manage volatility and mitigate external shocks. Given that the ongoing revolution in aid architecture and the development finance flows have significant implications for output fluctuations, one could expect also a change in the analysis of developing countries macroeconomic vulnerabilities. Indeed, developing countries appear more integrated and synchronized to the rest of the world and thus more vulnerable to external shocks. The thesis has shown that the risks associated to development cooperation seem to be more important than expected and provides incentives for governments to act policy reforms and improvement of governance quality.

Despite the macroeconomic challenges related to external financial flows and doubts about usefulness international measures for development, this thesis has also shown how far some of these support measures benefit to the less developed countries. This thesis has highlighted positive outcomes for LDCs during the last two decades that should comfort industrialized countries and international organizations to continue promoting and stimulating development in poor countries.